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PUBLIC HEALTH REPORTS

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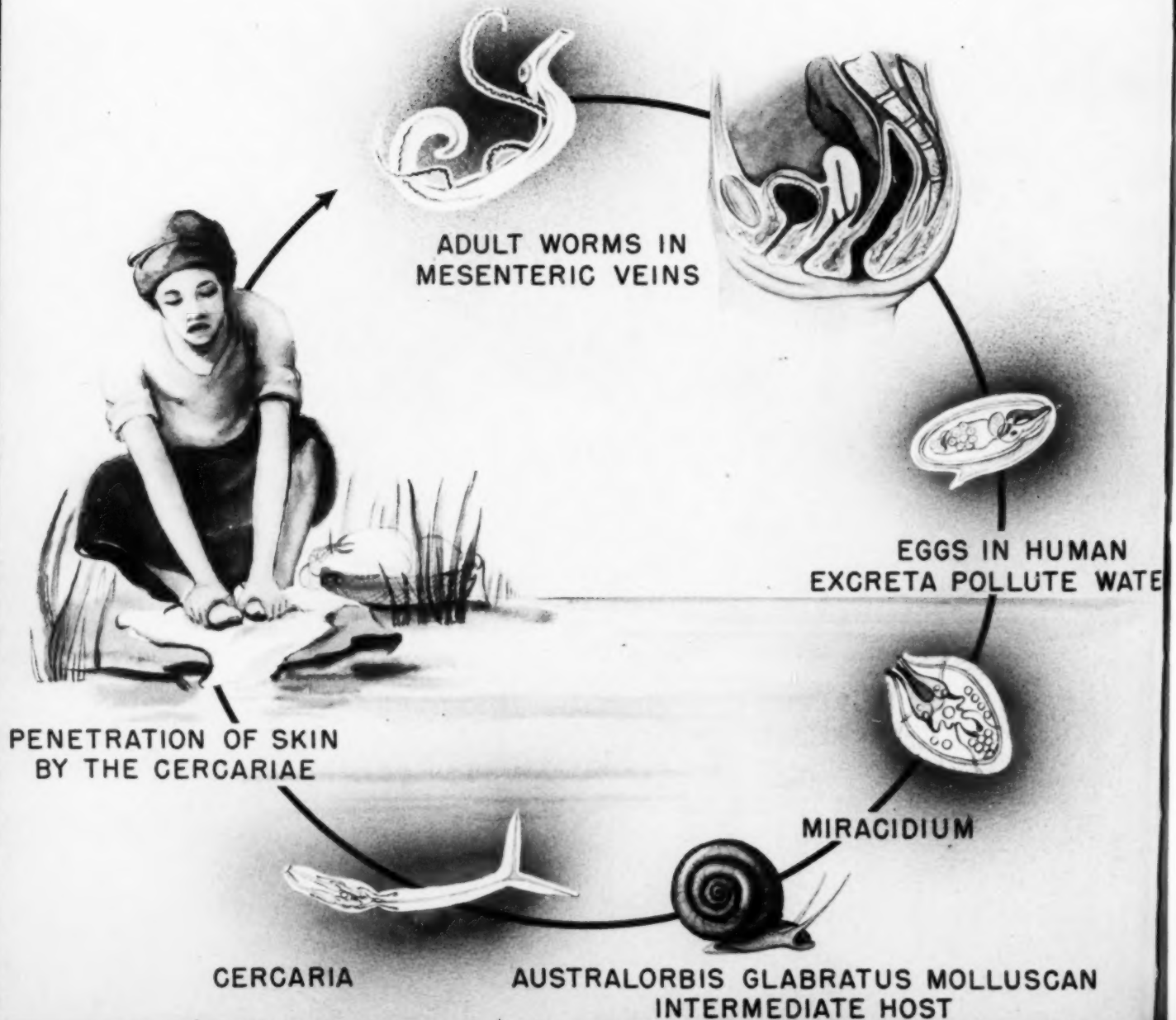
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service

LIFE CYCLE OF

Schistosoma mansoni

see overleaf



PUBLIC HEALTH REPORTS

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Schistosomiasis

The parasitic worms which cause schistosomiasis, a chronic disease present in about 114 million individuals throughout the world, follow a complex life cycle, illustrated on the frontispiece. The disease is particularly widespread in areas of the world with low standards of sanitation. In some areas of Egypt, for example, 90 percent of the population suffers from schistosomiasis, and the productive potential of the nation is estimated to be lowered one-third.

The worms responsible for the disease are commonly known as blood flukes. They inhabit veins of the abdominal cavity and pelvis. The eggs extruded by the female worms penetrate various tissues and may find their way to all or nearly all organs of the body, where they cause inflammatory reactions and interfere with normal body function.

Various attempts to control schistosomiasis have included improved sanitation, mass chemotherapy, and attack on the snail intermediate hosts. The latter measure is one of the most promising, and in recent years attention has been focused on new chemicals which might be more effective. In many areas, transmission of the disease is intimately linked with age-old agricultural and religious practices, which are difficult to change. This, plus the fact that there is no satisfactory treatment for the disease, points to control of the snail hosts as one of the most promising approaches to the problem.

A debilitating affliction which often makes its victims too sick or too weak to work, schistosomiasis runs a chronic course which may extend over many years. Death may result from cumulative damage to vital organs.

During the last few years, chemicals which have proved effective in snail eradication experiments in the laboratory have undergone extensive field tests in various parts of the world by scientists of the laboratory of tropical diseases in the National Institutes of Health of the Public Health Service. One such project was set up in Recife, Brazil, in cooperation with the Pan American Sanitary Bureau and Brazil's Ministry of Education and Health. This work is reviewed by Wright and Dobrovolsky on p. 1156 of this issue of *Public Health Reports*.

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Charlotte Green Schwartz.

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The Occurrence of Influenza In the United States, 1952-53

By DORLAND J. DAVIS, M.D., and CARL C. DAUER, M.D.

UNDER THE SPONSORSHIP of the World Health Organization, a worldwide effort to improve the reporting and epidemiological study of influenza and the exchange of virus strains has been in effect for the last 6 years.

In the United States the WHO Influenza Study Program has been ably supported by investigators and diagnostic laboratories of State and Federal agencies, universities, the Department of Defense, and those associated with the Commission on Influenza of the Armed Forces Epidemiological Board. A previous report described the organization and specific objectives of the program and listed the participating laboratories (1). The present report will summarize the information obtained by these investigators and the mortality experience as reported by State and city health officers for the period from July 1, 1952, to June 30, 1953.

Dr. Davis is executive secretary of the Influenza Information Center, WHO Influenza Study Program in the United States, National Institutes of Health, Public Health Service. He is also chief of the influenza unit in the laboratory of infectious diseases, National Microbiological Institute of the Public Health Service.

Dr. Dauer is medical adviser to the chief of the National Office of Vital Statistics, Public Health Service.

Investigations of recent years have shown that there has been a progressive change in the antigenic pattern of strains of influenza virus, and attempts have been made to indicate this change in the designations of types, such as the widely used term influenza A'. These designations have been convenient but not completely satisfactory. The WHO Expert Committee on Influenza (2) recommends:

the subdivision of the influenza A virus into the following main groups, which are named after their prototype viruses and the date of their isolation:

WS (1933)
PRS (1934)
FM1 (1947)

The recent A strains, of which FW/1/50 and A/England/1/51 are examples, though different from FM1, are not as divergent as the other main groups and are therefore considered to fall within the FM1 (1947) group. There is also a heterogeneous group of swine influenza viruses related antigenically to the human influenza A viruses.

The influenza B viruses should be subdivided into groups with the general characteristics of:

Lee (1940)
Bon (1943)

The most recent influenza B strains (1952) appear to diverge from Bon, and it may be found on the basis of future experience that further groups must be created.

In influenza C only one antigenic group is so far known, of which 1233 (1947) is the prototype.

Thus, the strains recovered during the 1952-53 season and referred to as A' because of their similarity to the FW/1/50 of FM1 strains,

which were used most widely for diagnosis, will be designated as belonging to the group FM1 (1947) in this report. Final studies may justify the designation of the 1953 strains as a separate group, but the recommendations of the WHO expert committee will be followed in the present report. Since various influenza strains were used as antigens for the hemagglutination inhibition and complement fixation tests by the different collaborating laboratories, results of serologic diagnoses will be recorded in tables 1 and 2 as either type A or type B with no attempt to differentiate further between strains.

Occurrence of the Disease

No outbreaks of influenza were reported within the United States during the summer and fall of 1952. There were, however, a few cases diagnosed serologically as influenza B and a few cases diagnosed as influenza A (FM1 (1947)) during October and November in military installations in the United States. A small outbreak of influenza-like disease occurred during the latter part of November at a military installation in the Philippine Islands, and several of the cases were subsequently specifically diagnosed as influenza A (FM1 (1947)).

In early December 1952, a definite increase in the incidence of acute respiratory disease occurred among military personnel at Fort Leonard Wood, Mo. The number of cases increased sharply and had reached a relatively high incidence by the last week of December. At this time an influenza A virus closely related to A/FW/1/50 was recovered from a significant number of cases, and serologic studies gave further evidence of influenza infection. However, not all cases studied were established as influenza, and the possibility of the concurrent presence of another disease was studied by military investigators.

During the same week in December, State health officials reported an influenza-like disease in Pueblo, Colo., and in nearby cities. This also was subsequently confirmed by laboratory tests as influenza A (FM1 (1947)). In Watauga County, N. C., a sharp epidemic with a high incidence rate was reported during the same week and shown to be influenza of the same type. Reports from the military services

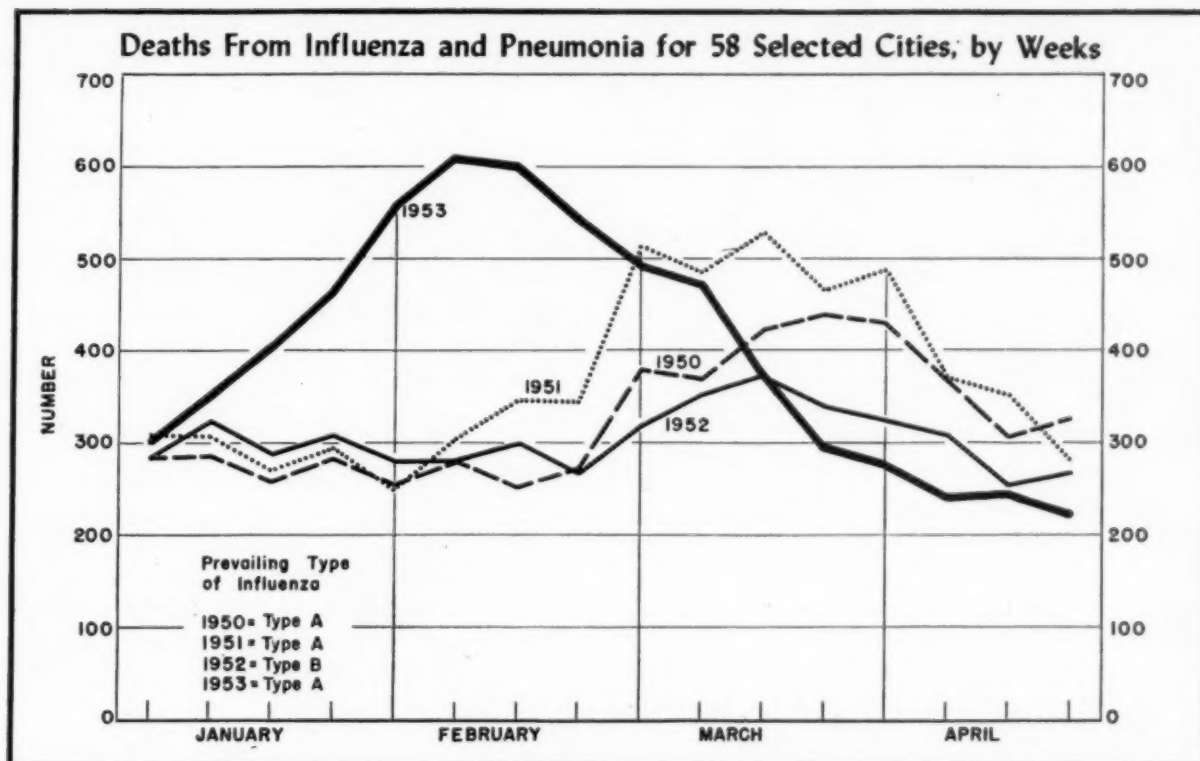
indicated an increased number of cases of influenza in the Far East in late November and December, principally in Okinawa and Japan.

January 1953 Epidemic

During the first week of January 1953, influenza occurred in epidemic form in Iowa, Indiana, South Dakota, Oklahoma, Missouri, and Florida. By the second and third weeks of the month the outbreaks were reported from most of the middle western and southern States. Texas was particularly affected, and a large number of cases was reported. Subsequent reports indicate that influenza virus A (FM1 (1947)) was frequently recovered. The southeastern part of the United States also was affected, and the disease was specifically diagnosed in the Washington, D. C., area, Norfolk, Va., and other parts of Virginia. The northeast and New England area had a few localized outbreaks particularly noticeable in military installations, but the incidence generally was not high. On the west coast, the incidence was slightly increased but did not approach that of the midwest. Sharp outbreaks in the military and civilian population in Alaska began the first week of January and persisted throughout the month. Toward the end of January the incidence of disease in affected military installations fell off although in civilian populations incidence remained high, and new areas within the midwest and south reported outbreaks. In many of these areas schools were closed because of the illness among pupils and teachers. By the end of the month, the incidence was declining in most areas.

In the early part of February 1953, the incidence continued to decline, and during the remainder of February and early in March, a few scattered outbreaks of influenza occurred, particularly in schools and institutions, not only in the midwest and the south but also in the northeast and the west. No outbreaks have been reported in the United States since that time.

The total number of isolations of influenza virus and positive serologic tests reported from all participating laboratories in the continental United States and the Territory of Alaska by date of onset or collection for each month are presented in table 1. In addition, 16 strains of



influenza A were recovered and 355 positive serologic tests for influenza A were made for which the month of onset or collection date was not exactly known although presumably it was during the period of highest incidence. Not shown in the table is a record of a case of influenza C diagnosed by the complement fixation test which occurred in Chicago during December 1952.

These data indicate that influenza A (FM1 (1947)) was almost exclusively the cause of the epidemic and that only a few sporadic influenza B infections occurred. That January was the month of highest incidence of specifically diagnosed cases conforms to the reports of the occurrence of outbreak received from health officers.

Dr. Clayton G. Loosli of the collaborating laboratory at the University of Chicago has submitted the following observations on the clinical features of the disease:

Although generally reported as mild, influenza infections produced in some cases severe prostration. They were sudden in onset beginning with high fever, marked headache, malaise, muscle aches and pains, and

dry cough. Some had photophobia. A few having etiological or serologic evidence of influenza also had symptoms of the common cold, sinusitis or a pneumonitis. Three cases with typical findings of pneumococcal pneumonia due to pneumococcus types I, II or III also had etiological or serologic evidence of influenza. The average hospital stay of uncomplicated influenza was approximately 5 days.

Mortality From Influenza

As shown in the accompanying chart, the number of deaths from influenza and pneumonia in 58 selected cities, which are located in all parts of the United States, began to increase early in January 1953. These diagnoses are based on records of death certificates and do not represent laboratory confirmed cases of influenza. The peak was reached in early February; after that time the number gradually declined. In the 3 years immediately preceding 1953, an increase in deaths from influenza and pneumonia did not begin until late in February, and in none of these years was the number reported as great as it was in 1953.

Data from 8 of the 58 cities were obtained on

Table 1. Isolations of influenza virus and positive serologic tests (any technique) reported by civilian and military laboratories participating in the United States and Alaska

Month and year	Isolation of virus		Positive serologic tests	
	A	B	A	B
December 1952.....	10	-----	29	4
January 1953.....	237	1	1, 148	22
February 1953.....	105	-----	1, 059	9
March 1953.....	27	-----	377	1
April 1953.....	-----	-----	69	3
May 1953.....	-----	-----	21	-----
Total.....	379	1	2, 703	39

numbers of deaths from influenza and pneumonia during January and February 1953 for broad age groups. The deaths from influenza and pneumonia combined showed the following distribution: 22.7 percent were in persons under 15 years; 1.3 percent were in the 15- to 24-year group; 28.4 percent in the 25- to 64-year group; and 47.5 percent were 65 years and over. The percentage distribution of influenza deaths was 7.7, 2.3, 20.9, and 69.0, respectively, for the above

Table 2. Estimated death rates per 100,000 population for the United States from all causes, and from influenza, pneumonia, and major cardiovascular-renal diseases, for certain months of 1951, 1952, and 1953

Month and year	All causes	Influenza	Pneumonia	Cardiovascular-renal diseases
December 1952.....	1, 014. 2	3. 4	31. 4	547. 5
January 1953.....	1, 083. 1	17. 1	48. 4	590. 7
February 1953.....	1, 131. 6	26. 4	49. 5	610. 7
March 1953.....	1, 021. 2	13. 6	34. 0	561. 7
April 1953.....	955. 7	5. 0	26. 0	524. 2
December 1951.....	1, 027. 2	3. 1	31. 0	551. 7
January 1952.....	1, 003. 5	4. 6	36. 6	544. 3
February 1952.....	1, 015. 6	8. 4	34. 7	538. 0
March 1952.....	1, 059. 5	12. 3	41. 0	568. 4
April 1952.....	982. 4	5. 4	31. 5	530. 5

age groups. These data indicate that persons in the older age groups felt the impact of the influenza epidemic more than younger persons.

The figures in table 2 have been taken from the *Monthly Vital Statistics Reports* of the National Office of Vital Statistics, Public Health Service. They show the estimated death rates for the United States from all causes; and from influenza, pneumonia, and major cardiovascular-renal diseases, based on a 10-percent sample; and they cover the periods when influenza was prevalent in 1952 and 1953. Although these data are subject to random sampling errors, they show that the number of deaths from all causes and from pneumonia and cardiovascular-renal diseases increased moderately and that those from influenza increased markedly during the period when influenza was known to be prevalent. The increases were greater in 1953 than in 1952; this is consistent with the data for 58 cities shown on page 1143.

Antigenic Analysis of 1953 Strains

The WHO Strain Study Center for the Americas, located in the laboratory of Dr. T. P. Magill, State University Medical Center at New York, Brooklyn, N. Y., has studied the antigenic characteristics of 24 strains of influenza virus isolated late in 1952 and in 1953 by various workers. Hemagglutination inhibition tests were performed with these strains and cholera-filtrate treated rabbit antisera which were prepared against 8 chronologically separated strains:

A/PR8/34.	A/FW/1/50.
A/New York/41	A/England/1/51.
(Coyle).	A/New York/1/53.
A/FM1/47.	A/Ohio/1/53.
A/Nederland/1/49.	

These tests showed clearly that the recently isolated strains were influenza A virus but were different antigenically from previously isolated ones. The 1952-53 strains possessed some antigenic components which were undetectable or inconspicuous in the older strains. They differed in practically the same degree from A/FM1/47, the prototype of the A' strains, as the latter differs from the PR8 strain in 1934. This adds further evidence to the concept of an apparently orderly alteration in the antigenic

The Virus, the Cell, and the Potentialities of Influenza

"I have spoken throughout as if influenza virus were no more than a laboratory tool, a subtle probe with which to explore the finer structure and functioning of the living cell. It would not be fitting, however, to end this lecture without reminding you that influenza virus is also an important agent of disease. It is a virus which even in 1951 killed heavily amongst the old people of Europe and in 1918-19 generated the third great plague of recorded history. Of all virus diseases influenza is probably that in which mutational changes in the virus are of greatest human importance. We can only guess what type of virus was responsible in 1918-19 and what changes took place during the course of the pandemic. But even in the period since the human virus was first isolated in 1933 there have been striking changes in the immunological character of both influenza A and B viruses. Some of us believe that the influenza virus' chief means of survival

is its capacity for constant mutation to new serological patterns, and those of us who have had anything to do with the production of influenza vaccines know very well how that capacity can nullify the most painstaking work. Infectious disease today has lost most of its terrors, and in America at least the peaks of mortality that always marks the passage of an influenza epidemic are becoming smaller. But no one yet can say whether or when we shall see another pandemic outbreak of influenza. Until we know the answer to that question we should not be too complacent about our powers to deal with acute infectious disease. Even the most academic-seeming of investigations, like those I have described, may one day become matters of life and death."

—Sir F. MACFARLANE BURNET, F. R. S.,
in the Second R. E. Dyer Lecture, 1952,
Public Health Service Publication No. 328.

composition of influenza viruses by the appearance or dominance of new components and the suppression or disappearance of others as determined by this method of analysis.

Influenza Outside the United States

From outbreaks of influenza in South Africa during June 1952 and on Bahrein Island during September, strains of influenza A (FM1 (1947)) were isolated and identified by the laboratories cooperating in the World Health Organization study. Influenza was next reported in the Far East, Japan, and the Philippine Islands in early December 1952. Approximately coincident with highest occurrence of the disease in the United States during January 1953, outbreaks appeared in France, Germany, and southern England, later extending to the Scandinavian countries, Switzerland, and Austria, and to scattered parts of Europe. The isolated strains were all influenza A (FM1 (1947)), similar to those isolated in 1951 and to those

recovered in the United States during January 1953.

Later in 1953, during May, June, and July, influenza appeared in the Central American and South American countries in large outbreaks, but virus strains have not yet been completely studied. Mortality reports indicate that the death rates in European and South American countries were similar to those in the United States with some increase in the death rate from influenza and pneumonia, but the increase was largely confined to the older age groups of the population.

Comments and Conclusions

The broad picture presented here shows that influenza A was widespread throughout the Americas and Europe during the 1953 season, although some large areas were spared. It is to be remembered that during the previous season in 1952, influenza B was locally prevalent although not of such high incidence in North

America and Europe, and influenza A was practically absent. During the winter 1950-51, influenza A caused serious epidemics in northern England, particularly in Liverpool, and in northern Europe during December and January, and it was also occurring in the northeastern part of the United States. In the 1953 experience, the highest incidence in the United States was in the midwest and the south. The northeastern part which had been affected 2 years previously was largely spared with the exception of some military installations.

The mortality data here presented indicate that a significant number of deaths resulted from influenza and that this disease is still an important cause of deaths. This is true in spite of the availability of antibiotics and their presumed widespread use in the treatment of severe respiratory infections. Perhaps too

complete confidence in the ability of the antibiotics to reduce deaths from pneumonia, and thus alleviate the chief danger from influenza, may not be justified.

• • •

Current lists of laboratories and observers participating in the Influenza Study Program in the United States may be obtained from the Influenza Information Center, National Institutes of Health, Public Health Service, Bethesda, Md.

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Labeling Salt in Food

Two actions to protect persons suffering from some types of heart disease, or from high blood pressure, who are on "low-sodium" or "low-salt" diets have been taken by the Food and Drug Administration of the Department of Health, Education, and Welfare.

The aim of these actions is to improve the labeling of special dietary foods, and of certain frozen vegetables commonly used in low-salt diets, so that patients and physicians will be better able to calculate the sodium intake from such foods. In one action, the Department published a statement of policy in the Federal Register, to the effect that it will henceforth expect all labels of frozen vegetables to declare the presence of salt whether added directly or indirectly to these products.

FDA explained that frozen vegetables are quite commonly supposed to be salt-free, and on that account are largely used in low-salt diets. Actually, salt brine is used in the preparation of

certain of these vegetables, particularly frozen peas and frozen lima beans, as a means of quality separation (the younger and more tender peas or beans will float in the brine). This process may add a substantial amount of salt to the frozen product, which would be of significance to persons seeking to restrict their salt intake.

In the second action, the Secretary of the Department of Health, Education, and Welfare gave notice in the Federal Register that public hearings will be started on December 15, 1953, in Washington, to amend the FDA dietary food labeling regulations so as to require label declaration of sodium in low-sodium foods on the basis of their sodium content in milligrams of sodium per 100 gm. (roughly one small serving) of the food. FDA said that the declaration of sodium content on this basis conforms with the recommendation of the American Heart Association and the Council on Foods and Nutrition of the American Medical Association.

New Orientation in the Teaching of Preventive Medicine

By W. PALMER DEARING, M.D.

ALL OF US in this world conference on medical education are concerned with methods of equipping the physician of tomorrow for his full role in raising the level of health of the people he serves. That role will obviously vary from place to place and from time to time, depending on the particular health problems that predominate in a given country and on the capability of medical knowledge to solve those problems.

No system of medical science and thought in the world today can claim the capacity to solve all health problems. Some diseases of world-wide prevalence, such as malaria and enteric infections, cannot be dealt with effectively without the application of engineering and sanitary science. Others, such as the nutritional deficiency diseases, cannot be dealt with effectively

without attention to economic and social conditions.

Moreover, since no physician can function apart from the society in which he lives, his role will depend upon the degree of acceptance which the people give him. H. Cullumbine (1) found, for example, in his recent survey in Ceylon, that practitioners trained in Western medicine and those trained in the Ayurvedic systems were each called upon to treat about one-fourth of the illnesses reported by some 18,000 families, and that 1 in every 20 sick persons was receiving treatment from both types. Dr. Cullumbine comments: "Patients with illnesses which Western medicine has shown it can control are placed in the care of Western practitioners; where such superiority on the part of Western medical science has still to be conclu-

Dr. Dearing has been Deputy Surgeon General of the Public Health Service since 1948 and a commissioned officer of the Service since 1934. He began his public health work as an assistant in epidemiology at the Harvard University School of Public Health working with the late Dr. Milton J. Rosenau in teaching preventive medicine and hygiene to medical students. His assignments with the Public Health Service have included studies in tuberculosis epidemiology under the late Dr. L. L. Lumsden and early work with small-film X-rays. In 1945 he was deputy chief of the Division of Public Health Methods and in 1946 was named chief of the Division of Commissioned Officers in which post he was instrumental in undertaking a complete over-

hauling of policies and programs for recruitment, professional training, and assignment. During World War II he served as chief medical officer of the Office of Civilian Defense and as personnel chief of the Health Division, United Nations Relief and Rehabilitation Administration.

This paper was presented before the First World Conference on Medical Education at London, August 25, 1953. The conference, on the theme "standards of undergraduate medical education," was held under the auspices of the World Medical Association in collaboration with the World Health Organization, the Council for Organization of Medical Sciences, and the International Association of Universities.

sively proved to the layman, then help from the traditional Ayurvedic system is sought." I venture to predict that a similar study in any other society, Western or Eastern, would reveal a comparable independence on the part of patients in their choice of physician.

Terminology differs in England and the United States, as all of us are aware. The British physician refers to "social medicine"—the American, to "preventive medicine." Recognizing the terms as interchangeable, I will use the nomenclature of my own land.

The Need for Orientation

One of our philosophers, Professor Theodore M. Greene, of Yale University, describes the ideal doctor as "one who understands the human body as completely as possible in the light of all relevant sciences, who understands the human mind and its working as well as possible in the light of all relevant modern psychology and psychiatry, and who in addition understands a human being in his full potential spiritual stature" (2). In the light of modern health problems, I would add to this the requirement of an understanding of the physical and social environments in which his patients live.

If we in this conference can agree on these attributes of an ideal physician, we will readily discern the need for new orientation in the teaching of preventive medicine. For, although medical education today does a superlative job in giving the medical student a thorough grounding in anatomical and functional pathology, and skill in diagnosis and therapy, most people agree that it falls short in developing the deep understanding of human nature and human behavior which the physician must have if he is to practice prevention as well as to cure; to promote health as well as treat disease. Likewise, the medical school too often fails to prepare the student to apply the universal principles he has learned in settings other than that of the completely equipped and fully staffed teaching hospital. The medical school, therefore, needs to be as well grounded in the social milieu in which its graduates will practice as in the latest findings of medical science.

This means that no standard pattern for medical education can be applicable in all times and

places. What society requires of a medical school in Edinburgh or Boston will not necessarily meet the needs of society in Thailand or Lambarene. Yet the faculties, students, and practitioners in all these widely differing societies have much to share in knowledge and experiences.

Some Unsolved Problems

In this spirit of exchanging experience, I shall talk of our efforts in the United States to reorient certain aspects of medical education from the standpoint of preventive medicine, and I shall discuss some of the unsolved problems in my country.

Like my colleagues in public health work, I know that preventive medicine is not the exclusive field of the public health specialist. The increasing problem of cardiovascular diseases and cancer, of diabetes, rheumatic conditions, and mental disorders cannot be controlled by environmental sanitation, by immunization, or by quarantine. The recent shifts in the major causes of death and disability require the practicing physician to use preventive techniques in combating the health problems of a population whose proportion of old people is increasing. He must use all available health resources in a community to achieve early case finding, prompt diagnosis and followup treatment, and rehabilitation services—all contributing to prevention insofar as they forestall continuing disability and premature death.

Public health can be thought of as the organized application of preventive medicine, and traditionally it has been concerned with the prevention of health threats to the community as a whole. The private physician, when he is consulted by a person in an acute phase of illness, tends to be concerned primarily with restoration of the health of the individual.

Medicine has made phenomenal progress in diagnostic and therapeutic techniques, and medical education is geared to introduce the student without delay to new developments in these techniques. The medical schools have well-established departments in the basic and clinical sciences staffed by specialists who keep abreast of current advances in their fields. What is lacking is equal concern to advance

the knowledge and application of preventive measures in controlling the conditions that undermine health.

Social Changes Affecting Health

During the last half century revolutionary changes have occurred in community life in the United States. In place of the large stable family in a small, self-contained community, where social relationships are well established and all age groups have a place, we find smaller family groups that move frequently from place to place and maintain few continuing contacts with their neighbors and relatives. Earlier dependence on grandparents and aunts and cousins in time of illness or economic distress is being replaced by dependence on the community and its institutions.

Concurrently, methods of production have vastly improved, making possible higher standards of living. Education at all levels has become more widely available. Regional differences and barriers are diminishing under the impact of rapid communications. The interdependence of the welfare of the individual and the community is manifested in the growth of a multiplicity of community hospitals, public health departments, social welfare agencies, and systems of social insurance which have developed to meet newly identified needs.

Conditions of work, increased leisure time, and diversified recreational activity also manifest sharp contrasts with the past. High tension in both work and play and problems of personal relationships produce or intensify not only the emotional but also many of the physical disorders that are prevalent today. Prevention and treatment of these disorders require knowledge of the interplay of personal and environmental forces which condition man's behavior and his health.

Moreover, there is need for a new look at the modern environment. Preventive medicine research in the past found the sources of many infectious diseases in the insanitary environment, and today it is necessary to study the industrial and urban influence as the possible source of continuing and new health hazards which may be controlled on a community-wide basis. Pollution of the air and water by industrial wastes, substandard housing, and ex-

posure to new chemicals of unknown toxicity are all parts of the modern environment which contribute to the major health problems of the United States.

The Physician's Role in Preventive Medicine

The changes in American life have been accompanied by parallel changes in medical practice. Forty years ago, the family practitioner had intimate personal knowledge of his patients and their families. Today, however, he is yielding ground to relatively impersonal hospital practice by specialists, each often concerned with but a fraction of the total problem confronting the patient. At the same time, increased scientific knowledge and public understanding of health requirements have broadened the demands upon the medical profession.

Today's physician should be equipped to deal with the effects of the total environment on health—the social environment as well as the physical. He should be prepared to plan the total health care of the patient, preventive as well as therapeutic. Exclusive attention to a restricted range of biological phenomena can no longer be considered good medical practice.

There are many evidences that undergraduate medical education in the United States today falls short of preparing physicians for their full role in health maintenance and the prevention of disease. A conference on psychiatry and medical education, held in 1951, concluded that there is a concerted demand that physicians assume responsibility for the proper practice of preventive medicine. A questionnaire distributed to 3,500 community leaders throughout the United States by the conference's Preparatory Commission brought some 700 opinions that physicians of today are not giving the service expected of them. Some of the specific statements were: "They do not have time or inclination to listen to and consider the patient's feelings." "They do not have enough knowledge of emotional problems and socioeconomic family backgrounds." "In treating physical disease, they are often out of touch with the personal and social problems and pressures of the rank and file" (3). The conference report stresses the need for a greater mutual understanding between individuals and their

personal physicians and a greater degree of collaboration in the promotion of health.

Accurate diagnosis and prescription of remedies and treatment regimens taken by themselves may be of little avail in preventing illness or its recurrence. For example, a physician writes on Mrs. X's record: "Malnutrition slight. Inadequate intake due to poverty. Treatment: codliver oil tablets. Return in 1 month." The social worker, who has been in direct touch not only with Mrs. X but also with her family, has a broader view of the situation and, I think you will agree, a more constructive approach to treatment. She has studied the family budget and knows its limitations. She is helping Mrs. X to find a cheaper apartment nearer her husband's work in order to stretch the earnings. The social worker is thus taking action to prevent serious malnutrition by helping the family to have more money and food.

Another illustration comes from the family adviser service in the University of Pennsylvania Medical School. Mrs. G had high blood pressure and according to the family had no other health problems except that her father-in-law was ailing and irritable, and the children might be better off if they could play outdoors. The student health adviser's sympathetic talks with the father-in-law induced the latter to undergo regular treatment for his pernicious anemia. The health adviser also found a nearby church whose minister was delighted to have the churchyard used as a playground. Mrs. G's blood pressure, to her surprise, kept going down. The medical student who served as the family health adviser might have needed many years of experience in practice to learn for himself that high blood pressure can sometimes be alleviated by treating some other person's ailments and by getting a playground for the children (4).

I am sure that the experience of my colleagues in other parts of the world leads to the same conclusion we are arriving at in the United States: that the diversity of specialized medical and related services available in the modern community requires today's medical student to have knowledge of all community resources for preventive medicine. He must learn how to establish working relationships among a variety of specialized personnel and facilities if people

are to receive the services needed to prevent and treat illness and to return patients to useful activity.

In addition to his concern with individual patients and their families, the physician should also be prepared to assume leadership in the attack which the community makes upon health problems through the organization and operation of community health services. If medical schools are to do a good job in training the physicians for this leadership role, they must give attention to the health problems of communities as such. Medical schools as well as their graduates should realize that, if physicians relegate themselves to the role of medical technician, there is real danger that leadership in organizing medical and related services which the public demands will, by default, be forced upon others.

Strengthening Communication and Teamwork

Dr. Alan Gregg, in an address at the annual meeting of the Association of American Medical Colleges in 1952 (5), made an eloquent plea for better communication among the numerous specialists in medicine and between medicine as a whole and the public at large. He draws a striking analogy between the paralysis, necrosis, and other disturbances of function which result from disruption of the communication systems within the human body—the lymphatics, the blood vessels, and the nerves—and the eventual fate of medicine if some way is not found to foster communications between the "steadily proliferating subdivisions, bailiwicks, precincts, disciplines, and specialties." I would like to elaborate Dr. Gregg's thought to identify the social sciences—sociology, anthropology, and economics—as disciplines with which medicine must specifically improve communication.

These questions of communication and teamwork are the active concern of medical educators. The Association of American Medical Colleges joined with the American Psychiatric Association in organizing and conducting two conferences on psychiatry and medical education, one of which was mentioned earlier. The Association of American Medical Colleges similarly sponsored and took an active part in a

Joint Conference on the Teaching of Preventive Medicine. The experience gained in these three conferences has led the Association of American Medical Colleges to plan a series of teaching institutes to cover the entire structure of medical education.

Dr. George Packer Berry, dean of Harvard Medical School and past president of the association, reports that these institutes, to be held at annual intervals, will include sessions to consider the interrelationships in teaching among groups of the basic sciences, medical ecology, clinical teaching including the internship, and specialty training and the continuing education of the physician (6). As a device to focus the interest of the several medical departments on methods of integrating their work, these institutes will promote mutual understanding and community of purpose among the various specialized subdivisions of medical education and the related institutions in the community.

A national Commission on Chronic Illness, established in 1949, held a conference on the preventive aspects of chronic disease in 1951 (7). All interested professional groups were represented. In addition to medical education, health and social welfare agencies and the public were represented. That conference produced an inventory of current scientific knowledge concerning the nature and prevention of the chronic diseases. Considered also was the problem of improving care for the chronically ill, covering such fields as professional education and organization and coordination of services. Medical educators and physicians who participate in such conferences contribute sound medical guidance. At the same time they gain a deeper insight into the skills and potential contributions of other professions in dealing with common problems.

A national conference on cardiovascular disease in 1950 (8), in addition to sections on technical knowledge and research, included important committees on community services for education and prevention, on case finding and epidemiology, on facilities and services for treatment and management, and on integration of community services. Represented in these committees were medical educators, cardiologists, health officers, hospital directors, and commu-

nity service agencies. The professional education committee dwelt upon the importance of including broad knowledge of the techniques and resources for prevention in the teaching programs for every profession.

In the same year a national conference on aging and its problems (9) considered a wide variety of social and economic factors involved in satisfactory health maintenance, work, recreation, religious activity, and living arrangements for the aging population. A section of that conference also stressed the need for giving professional personnel a clearer insight into the total phenomenon of aging in addition to their specialized technical instruction.

These and other conferences, groups, and seminars have contributed materially to the complex task of pulling together the viewpoints of traditional and emerging specialties in health and related fields. They have aided in identifying common interests and purposes; and they have set a base for the interchange of concepts and ideas which we know to be important to the preventive medicine component of modern medical education.

Strengthening Education in Preventive Medicine

Let us now consider some of the specific steps that some institutions are taking to meet the challenges we have been discussing. Methods of getting the student to see patients as individuals with families and jobs; of getting social science skills and viewpoints into medical schools; and of getting medical schools and their communities into more effective relationship with each other are being actively sought.

We are trying, for example, to restore some of the values formerly realized in the apprenticeship training on which medical education was once largely based. Obviously, we do not want simply to return to the past or to discard the advances of the last century. We do want, however, to improve methods by which the medical school itself can give the student an opportunity to complement his specialized training with an understanding of the role of the family physician.

Experiments being conducted in several schools in the United States represent the gradual introduction into the medical faculty

of representatives of the social sciences. This process started with the employment of social workers to assist in the clinical teaching of the social and community aspects of medicine. More recently sociologists have been appointed to several faculties to develop the application of the social sciences to medical education and research.

As an additional step in integrating the various essential components of medical education, several schools are experimenting with the expansion of their relationships with the community. These efforts are designed to provide a useful teaching and research laboratory in comprehensive medicine and are similar to experiments being conducted in other countries for similar purposes. Dr. Richard Scott (10) has recently described the Edinburgh University general practice teaching unit in which selected medical students are introduced to a "family doctor practice" for some 2,000 patients. The unit comprises two physicians, a public health nurse, a medical social worker, and a pharmacist. Dr. Scott points out that the students seem at first to be preoccupied with clinical matters, then become increasingly interested in the preventive aspects of general practice. During the next step the student talks more freely with the patient and becomes concerned with the physical and economic components of the patient's background.

In addition to their value as additions to the armamentarium of medical education, these developments will undoubtedly improve medical education's understanding of community needs and responses, and they will strengthen channels of communication between clinical medicine and other professional disciplines. This communication is essential to the practice of preventive medicine, and the opportunity for students to observe patients in environments other than the hospital ward should be of the greatest practical value.

Not all medical educators, however, are convinced of the feasibility or even the desirability of expanding the community relations of the medical school. A number of the deans interviewed in a study conducted by the Public Health Service (11) indicated that the costs of providing community services were a major deterrent; others cited problems of personnel

shortages. Some deans even questioned the propriety of extending the influence of medical schools through community services. They feared that such developments would divert the schools' already inadequate resources from the major functions of training and research.

This fear is understandable because of the financial crisis which is facing medical education in the United States. The great advances in medical science make medical education increasingly expensive.

An understanding between the community and the medical school of the role and responsibility of each, however, would allay the fears of medical educators about the burden of community service and would help materially to solve the financial problems of many schools. The high-grade medical service which accompanies clinical teaching constitutes a great benefit to the community, but it is simply a byproduct from the point of view of the medical school. In many parts of our country, it is, nevertheless, still customary to charge the cost of this service, including the full expense of operating a university hospital, to medical education. With this sort of bookkeeping, it is not surprising that a dean should view with concern a suggestion that he add to his costs and dilute the efforts of his already overworked faculty in order to supervise medical students in the community. The community needs to appreciate the service its citizens receive, either in a hospital or elsewhere, and to work out with the medical school a proper allocation of costs and assume its responsibility of paying for the medical service. If this is done, the medical school will have adequate resources to finance what is increasingly recognized as an essential part of its educational program.

Experiments in Community Service

Despite the questions and complexities, however, some medical schools are experimenting with methods to help their students to observe and understand the influence of home and family factors on health. Some of the devices which have been developed are social case studies; preceptorships; assignments of students to general practice clinics or as family advisers; and participation in home care programs.

In addition, several medical schools are assuming broader responsibilities for participating in the development of effective patterns of community health service. Each of these methods increases the student's opportunity for participation in the practice of preventive medicine and helps the medical faculty maintain a high degree of awareness of community structure and health needs.

Social Case Studies

Several medical schools in the United States are actively experimenting with methods of providing closer contact between medical students and the physical and social setting in which their patients live. One striking example is the family adviser service at the University of Pennsylvania Medical School (12). In this program a student, throughout his 4 years of undergraduate training, observes and studies all factors that affect the health of a carefully selected family—housing, food, manner of living, and family relations.

Other medical schools are endeavoring to orient students in the recognition of the importance of social factors of illness by having students conduct medical-social family studies during their supervised clinical experience. These studies are made with the aid of the social service departments of the teaching hospitals and include home visits (13, 14).

Preceptorship

The preceptorship is an adaptation to modern standards of practice and a modern social setup of the old apprenticeship method of training. Some medical schools assign senior students for several weeks or months to preceptorships with general practitioners. At the University of Nebraska, one of several institutions which has adopted this practice, evaluation of the program indicates that it equips the student with a perspective concerning the needs of individual patients and their families, the demands of general practice, and community resources (15, 16). The student has an opportunity to observe the methods used by skilled physicians in serving their patients. He sees patients in their normal home and working environment and observes the way in which physicians draw on public health, welfare, and

other agencies in dealing with the health and related problems of their patients.

The preceptorship system obviously needs careful selection of practitioners who can maintain close relationships with the medical schools in furthering the goals of the plan. The practitioners must, of course, have the time, competence, and type of practice needed to give satisfactory apprenticeship training. There also must be safeguards against the danger that the students will be used for services that have little educational value and thus lose the opportunity for learning the satisfaction of serving patients as people.

General Practice Clinic

Several schools are experimenting with the use of a general practice clinic for instructing students, in place of the exclusive use of specialty clinics. One such experiment is in progress at the University of Tennessee (17) where a large percentage of graduates enter general practice. Family practitioners in the community are on the staff of the "family general practice clinic." They assume primary responsibility for the care of the patient and have available specialists as necessary. The students thus have an opportunity to work with physicians who know at first hand the problems and resources of their community. They also study social and environmental factors in health and illness with the aid of a social worker assigned to the clinic.

A similar program adapted to practice in an urban area is that at the Cornell University School of Medicine (18). In this New York City institution, senior students are assigned for 22½ weeks to a combined clinic in medicine, pediatrics, psychiatry, and preventive medicine. A full-time staff from the departments of medicine and pediatrics forms a nucleus for the organization of this teaching device. The department of preventive medicine focuses all its fourth-year teaching in the clinic. A full-time social worker and a visiting nurse are assigned to the clinic, and part-time specialist consultants are available.

There are many other developments in the direction of expanding community relations of medical schools, but these indicate the trends.

Contribution of the Social Sciences

Mentioned earlier were the contributions the social sciences can make in the preparation of physicians for their full role in the practice of preventive medicine. By drawing on the departments of sociology, psychology, anthropology, and economics, for example, some schools are enriching the curricula of premedical and undergraduate medical education. By bringing the social case worker onto the team of physicians, students, and nurses in the experimental programs described, some medical schools are providing valuable learning experience in social diagnosis and therapy.

There are other fields in which the social sciences can be used more extensively and to great advantage in medical schools. In the selection of applicants for admission, for example, medical schools might well draw on the techniques of educational psychology. These techniques are aimed at more precise evaluation of a candidate's personal attributes so as to distinguish those individuals who give promise of success in the study and practice of medicine.

Application of new knowledge in the psychology of learning can aid the medical school in improving its methods of teaching. Recent studies clearly indicate the need for greater use of visual aids in the teaching of "didactic" subjects. Greater understanding of the dynamics of interpersonal relations, moreover, will help in promoting interdepartmental collaboration at the faculty level, both within the medical school and with other colleges of the university.

Finally, there are large fundamental problems in preventive medicine and public health which cannot be solved without the combined efforts of medical research with social and biological research. When a major health problem of a community is being solved by treating the environment—as in enteric infections—many millions of individuals are protected from disease without realizing what has happened.

However, when the preventive measures require individual decision and action, we are faced with fundamental problems of individual and group behavior. This is true in gaining a family's acceptance of immunization or a mother's acceptance of healthful practices in infant and child care. The task is even more

difficult in gaining the cooperation of individuals and families with the physician in his efforts to prevent chronic disease and mental illness and to maintain personal health.

Research into the "how and why" of individual and group behavior is being recognized by many leaders in preventive medicine and public health as essential to professional education and to sound planning of public health programs. Such research involves both the medical and social sciences, and the medical school can be a leader and a partner, through the initiation and support of studies in cooperation with the schools of social science.

Conclusions

The 4 years that the undergraduate student spends at medical school represent, of course, only one phase—though an extremely important one—of a life-time training in preventive medicine. His home environment, his earliest schooling, and his premedical education lay the foundations for his medical career and for his role in family practice, in a clinical specialty, in industrial medicine, in hospitals, in public health, in research, or in teaching future physicians.

Raymond Allen, the physician-president of one of our large universities (19), has expressed a thought with which I would like to close. He says, "Medicine with its age-old concern for the sick, the poor as well as the rich, the weak as well as the strong, has been an influence for good surpassed only by the moral precepts of religion." Medicine of the future, if it is to progress as a social as well as a biological science, must broaden its outlook and adjust its educational program accordingly.

I believe we can all agree that as Dr. Allen states, medicine is coming of age as a social science in the service of society.

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Increase in Social Insurance Recipients

As of July 1953, 4.4 million people were receiving old-age and survivors insurance benefits under the Social Security Act, and 2.6 million people over 65 were receiving old-age assistance payments, according to the Social Security Administration, Department of Health, Education, and Welfare.

In 37 States, more old people received these insurance benefits in 1953 than received old-age assistance. This was true of only 22 States in 1951. The States in which old-age assistance recipients still outnumber those receiving social insurance benefits are mainly agricultural and include a number of low-income States.

The major shift during the last 2 years from assistance to insurance as a source of income for the aged is largely the result of 1950 amendments to the Social Security Act which made more of the aged eligible for insurance benefits.

Experiments In the Control Of Schistosomiasis In Brazil

By WILLARD H. WRIGHT, Ph.D., and
CHARLES G. DOBROVOLNY, Ph.D.

SCHISTOSOMIASIS, a disease caused by three species of human blood flukes, *Schistosoma haematobium*, *S. mansoni*, and *S. japonicum*, is widely distributed in Africa, the Near East, the Orient, the Caribbean area, and parts of South America. It has been estimated (1) that there are 114,400,000 individuals in the world who are infected with the disease. It usually runs a chronic course, and the patient may suffer for years before finally succumbing to the cumulative damage or intercurrent infection. In most endemic areas, natives are



Australorbis glabratus

continually exposed to the disease, and repeated infections are the rule.

Schistosomiasis is not an acute fulminating disease with the spectacular manifestations of cholera, yellow fever, or some other bacterial or viral infections. Because of this, the public health importance of schistosomiasis has received little attention until recently. However, now that the success of residual insecticides in malaria control has been demonstrated, health agencies in some countries are encouraged to devote more attention to the possibilities of

Dr. Wright has been chief of the laboratory of tropical diseases, National Institutes of Health, Public Health Service, since 1939 when the laboratory was known as the division of zoology. Dr. Wright was field director of the Army Surgeon General's Commission on Schistosomiasis in the Southwest Pacific and Japan in 1945-46. He has been past president and councilor of the American Society of Parasitologists. He is currently a lecturer in medical zoology at the George Washington University School of Medicine and a visiting lecturer in tropical public health at Harvard University.

Dr. Dobrovolsky, a parasitologist on the staff of the laboratory of tropical diseases, National Microbiological Institute, National Institutes of Health, came to the Public Health Service in 1948 from the University of New Hampshire, where he was chairman of the division of biological sciences. He participated in the laboratory's malaria study in Guatemala in 1948-50 and since 1951 has been at Recife, Brazil, working on the field experiments with molluscicides.

On the frontispiece of this issue of Public Health Reports are shown all stages in the life cycle of the human blood fluke, *Schistosoma mansoni*.

controlling schistosomiasis by means of vector elimination.

An Economic Burden

Because of its debilitating nature, schistosomiasis exacts a considerable economic toll in many areas in which it is endemic. In Egypt, it is estimated that the disease costs the country approximately \$57 million a year and lowers the productivity of the population by 33 percent. In Japan, health officials of Fukuoka and Saga prefectures have estimated that the cost of the disease in the endemic area on the island of Kyushu runs to \$2,522,200 a year in wages alone, not counting costs of medical care. Since schistosomiasis is highly endemic in many of the world areas from which the United States draws strategic materials, the disease, along with other tropical infections, represents a substantial tax on imports which this country buys from such areas.

In 1943, the laboratory of tropical diseases of the Public Health Service undertook, at the request of the Surgeon General of the Army, certain studies on schistosomiasis of importance from the standpoint of military preventive medicine. Somewhat later, when it appeared that military personnel might become infected with the disease and serve as focuses for possible establishment of the disease in the continental United States, experiments were undertaken to determine whether any domestic species of snails could serve as intermediate hosts. The effect of water and sewage treatment processes on infectious material was also studied.

Studies on Snail Destruction

The availability of suitable snail hosts in laboratory colonies provided the opportunity for studies on snail destruction as a method of control for the disease. These studies were inaugurated after World War II, and many hundreds of chemical compounds were screened for their effectiveness against *Australorbis glabratus*, the snail which serves as intermediate host of *S. mansoni* in the Caribbean area and certain parts of South America (2). The results of the laboratory tests provided data for a correla-

tion between chemical structure and molluscicidal activity and indicated a number of compounds with sufficient promise for field testing. Initial tests were carried out in Texas (3) against snails closely related to vectors in South America and later against *A. glabratus* in endemic areas of the disease in Puerto Rico (4). Subsequently, in cooperation with the Mutual Security Agency and the British Colonial Office, tests were extended to Nigeria and Sierra Leone by personnel of the laboratory of tropical diseases.

Among the chemicals tested in the field, sodium pentachlorophenate has proved one of the most effective. This chemical is in ready supply commercially and is reasonable in cost. In one test in Puerto Rico, a single application costing \$7 destroyed all *A. glabratus* present in a stream $3\frac{1}{3}$ kilometers long, and the area remained free of infestation for several months. At Tudun Wada, Nigeria, \$3 worth of the chemical eradicated all of the schistosome vectors (*Biomphalaria pfeifferi* and *Physopsis africana*) from a stream 2.2 km. in length, and the stream remained free of these snails for nearly 11 months. At Rigachikun in northern Nigeria, these same species were eradicated and remained absent for 16 months from a stream 4.4 km. in length at a cost of less than a half penny per person of the population in the area.



Technician removes snails from tanks in preparation to test snail-killing efficacy of chemicals. Experiments conducted at the laboratory of tropical diseases, National Institutes of Health, Public Health Service, Bethesda, Md.

No Specific Treatment

The attack on the molluscan intermediate host offers one of the most promising approaches to the control of schistosomiasis. At the present time, there is no specific treatment for the disease, and efforts to effect control through chemotherapy have generally resulted in failure. Sanitary control through the proper disposal of excreta containing the ova of the parasite is complicated in many parts of the world because of religious or agricultural practices. Furthermore, many workers in certain types of agriculture are constantly exposed to infection, thus creating an occupational hazard. For these reasons, it would be difficult to change present practices for the purpose of avoiding infection.

Cooperative Project in Brazil

The preliminary field trials on snail destruction led to an extended study of certain molluscacides under field conditions in Brazil. This cooperative project was begun in February 1951 under the auspices of the Pan American Sanitary Bureau and at the invitation of the Ministry of Education and Health of Brazil. Two scientists from the laboratory of tropical diseases, National Institutes of Health, were detailed to the project, and transportation in the country, technical assistance and equipment, and laboratory space were provided by the Brazilian Ministry of Education and Health.

Headquarters for the project were established at the Instituto Aggeu Magalhães in the seaport city of Recife in the state of Pernambuco, which is in the heart of a highly endemic schistosomiasis region. This region, 7° to 15° south of the equator, extends from a narrow littoral along the Atlantic Coast to a low plateau several hundred miles inland. The plateau is intersected by numerous small rivers along which most of the villages and towns are located. The climate is tropical, humid along the coast, and dry in the semidesert area in the interior. The annual rainfall ranges from about 80 inches along the coast to a few inches on the inland plateau, almost all of it falling in the months from March to September.

The snail intermediate hosts, *A. glabratus*

and species of *Tropicorbis*, inhabit many of the fresh water streams, lakes, and drainage and irrigation ditches in this region. Because sanitary facilities, except in the largest cities, are completely lacking, these waters are used for all washing, bathing, and laundering. Water for cooking and drinking is frequently procured from the same sources.

Field Trials With 33 Chemicals

Thirty-three chemicals which had proved to be 100 percent effective against *A. glabratus* in concentrations of 10 ppm or less in tests conducted in the laboratory of tropical diseases were sent to Brazil for field trials.

Initial field trials with each compound were made in isolated test plots in still water pools or ditches. In some instances, dams were constructed in ditches to isolate control areas from treatment areas. Just before application of the chemical, the volume of water in liters of each test plot was computed from measurements of the length and the mean width and depth.



The highly endemic schistosomiasis regions in the Caribbean area and in South America are shown above in the shaded areas. Note particularly the coastal area of Brazil.

In the first experiments with each compound, the same method of application was employed—a solution or suspension of the chemical dispensed with a compressed air sprayer at a calculated rate of 10 ppm. Later, other methods of application, depending on the composition of the compound, were often employed. Some compounds were mixed with inert materials like talcum and applied with rotary dusters. Compounds in solution were soaked in dry sawdust, which was then dispersed by hand (5). The different methods employed with a given compound were usually about equally effective. Compounds found to be effective applied at 10 ppm were then tried in lower concentrations.

The pretreatment snail survey of each test plot was made shortly before the chemical was applied. Posttreatment surveys to determine the effects of the compounds on snails were made weekly or more frequently. The effectiveness of the chemical in each survey of each experiment was expressed in the percentage reduction in the snail population. The effectiveness at 10 ppm of 33 compounds in preliminary field trials in static waters was determined over a 6-week period following application. The results beyond 6 weeks of observation are not directly comparable because some test plots dried up.

The effectiveness of 8 of the 33 compounds tested was 90 percent or less. With 18 compounds, results of various trials showed complete kill of snails in some instances but only 90 percent reduction in snail population in others. The remaining 7 compounds found to be 99 to 100 percent effective against the snails in all tests were: pentabromophenol; pentachlorophenol (Hercules special emulsion); copper pentachlorophenate; sodium pentachlorophenate; bis(3,5,6-trichloro-2-hydroxyphenyl) methane; sodium salt of bis(3,5,6-trichloro-2-hydroxyphenyl) methane; and phenyl mercuric acetate. Most of the above compounds were also 95 to 100 percent effective when applied at a concentration of 2 ppm.

Value of Sodium Pentachlorophenate

Since many of the flowing streams in the highly endemic schistosomiasis region of Brazil are infested with snails, it is essential that mol-



Workers collect snails from one of the snail-infested streams in the state of Pernambuco, Brazil.

luscicides be effective in flowing water. Of the chemicals tested in streams, sodium pentachlorophenate proved to be the most effective. Because this chemical is not very toxic to mammals in the concentrations employed, it was used in extensive field trials in flowing waters.

In these experiments, the compound was usually applied at the head of the stream and in some instances at selected intervals along the stream. The amount of chemical to be applied was calculated from the rate of flow for a given number of hours at selected levels downstream. In most streams, the rate of flow was determined with the aid of a pigmy current meter or by construction of a weir. Different methods of application employed gave satisfactory results. Observations were also made on the rate and extent of dispersion of the compound in streams from samples of water (6) taken at various points below the sites of application. It was found that the disappearance of chemical from the water below the site of application in the stream was usually greater than expected on the basis of calculation. In most of the streams, the rate of disappearance was so rapid that little chemical was carried downstream more than 4,000 feet.

As might be expected from the above observations, the kill of snails was least successful in the lower parts of the stream. In most of the streams, the chemical was most effective in the area down to 1,000 feet below the site

of application, indicating the intervals at which application should be made. It was also found that sodium pentachlorophenate is usually most effective when applied at concentrations of at least 10 ppm. On the other hand, concentrations exceeding 20 ppm applied for 8 hours or more did not enhance the molluscicidal effects of the compound. The effectiveness is a function of time of application as well as of concentration. Thus concentrations as low as 2 ppm maintained for 40 hours were about as effective as high concentrations for 8 hours.

Effective Snail Abatement

A marked reduction—frequently 100 percent—of snail populations in streams was observed following a single application of sodium pentachlorophenate. No living snails were found in 11 of 28 streams during the first month after treatment, and in parts of some streams no living snails were discovered over a 12-month period. However, most of the waters from which the snails appeared to have been eradicated were repopulated by the fourth month after treatment. The sudden appearance of mature and large specimens in snail-free waters indicated that reinfestation was accomplished by snails which were not in the water at the time the chemical was applied. These streams appeared to have become reinfested in a number of ways. In moist, shady habitats, snails often migrate to the wet banks, and following treatment may return to the streams. Snails left stranded on the banks of streams following high waters and snails raked on the banks with vegetation when streams are cleaned go into estivation. During rains they may migrate or be washed back into the snail-free waters.

Since a single application usually produced effective control for about 3 months, various field trials were made to determine the effects of repeated applications of sodium pentachlorophenate at different levels of the stream and at selected intervals of time. In most of the sur-

veys made in these streams for periods up to 12 months, the reduction in the snail population was 95 to 100 percent, based on the first pretreatment snail counts. Results with the experiments conducted to date illustrate that effective snail abatement can be attained by treatments at intervals of 3 or 4 months. However, because of the ability of snails to survive in some of the ways mentioned, eradication of snails cannot be accomplished in 1 year.

In view of the different conditions under which sodium pentachlorophenate was applied, variable results were to be expected. Compared with the results reported elsewhere, there are indications that the technique of application of molluscicides may require considerable variation from one geographic area to another, depending on the ecologic conditions of the snails. In the main, the results obtained in Brazil have served to clarify some of the problems encountered in snail control and to suggest the need and direction for further experiments in the solution of these problems.

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Sanitation Problems in a Suburban Area

—Jackson County, Missouri—

By JACK K. SMITH, M.S.C.E.

JACKSON COUNTY, MO., is not a typical county. It may best be described as an urban-fringe area, or a girdle of homes, and schools, and shopping centers, of small industries, and small farms, and wide open spaces, which typically encircles a major city in the United States. Many of the workers in Kansas City, Mo., which lies within Jackson County's borders but not within its jurisdiction, have their homes in the residential communities which surround the city. With the growth and expansion of Kansas City, the problems of providing healthful living conditions for residents of the county become more and more complex. Sometimes these problems are not sufficiently known and are taken for granted.

Recently, the necessity for explaining the objectives of specific public health programs was brought forcefully to the attention of the Jackson County Health Department. Although the department had been in operation for more than 20 years, the Jackson County Court indi-

cated, when questioning the local unit about its purpose and activities, that in the thinking of the court, the activities of the health department centered around only one phase of health—the medical care of the indigent.

This lack of understanding on the part of the court, and undoubtedly on the part of the public, becomes all the more pertinent when one realizes that the Jackson County Court is not a part of the Missouri judicial system and that the term "court" is a misnomer—a vestige of the days when the judicial and administrative powers were combined in one local governmental unit. Apparently, the health department had temporarily failed in keeping the public, and likewise the court, continually informed about its purpose and its programs. It had failed, moreover, in explaining that its primary purpose is the prevention of sickness and that its activities were directed toward that end.

Community enlightenment is, of course, an essential ingredient of a health department's program. In Jackson County, as in other localities in the United States, the real purpose of a local sanitation program is improvement of the sanitary environment. But progress in any community program, let alone a health program, can be made only to the extent and at the pace desired by the residents of the community. No matter what value is placed on a local program by the professional health worker, the program, if it is to succeed, must have the support and understanding of the community.

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Some of the local sanitation programs in Jackson County have already benefited by public recognition of the need for their existence.

Milk Control Program

Jackson County's milk control program was inaugurated in 1940. It started slowly at first with an attempt to get the cooperation of the milk producers and dairies. A few, however, would not go along. One merchant in the vicinity of Kansas City made a "leader" of milk, which he obtained from any source and sold at a reduced price. County health officials explained to him that the milk control program was intended to assure a safe milk supply for the county, and told him to buy milk only from a rated source. The merchant, taking the attitude that the health department did not have the right to interfere, continued to sell ungraded milk.

At this point in the program, the health department decided to use enforcement as a means of education. Evidence of the merchant's selling ungraded milk was collected by the health department and presented to the magistrate's court, the lowest court in the county. The magistrate ruled in favor of the health department, and the merchant was fined. This was the only legal case involving the sale of milk which was ever tried in Jackson County.

The problem of milk control in the county area is diminishing because the large dairies in nearby Kansas City, Mo., are gradually taking over the distribution of milk. In 1940, there were about 50 small dairies in the county; most of these were raw milk dairies. Today, there are only 4 or 5 small dairies.

Because of overlapping milksheds, reciprocity in providing a safe milk supply was established with the Kansas City Health Department. The Kansas City Health Department now inspects all dairies selling milk within the limits of Kansas City; and milk plants licensed by the city health department are issued a permit by the county department. When Kansas City degrades a dairy, the county health department takes similar action. However, the few small pasteurization plants that are left—dairies that produce and pasteurize milk on the

farm—are under the supervision of the county department.

The cooperative inspection program between the city and the county extends beyond the city limits. Across the State line from Kansas City, Mo., is Kansas City, Kans., with a number of large dairies which have recently started to distribute milk in Missouri. Since these dairies are inspected and certified by the Kansas State Board of Health, the Jackson County Health Department decided to avoid duplication of inspection by accepting Kansas' certification. The Public Health Service through its regional office at Kansas City, Mo., provided a milk sanitation rating of the Kansas dairies desiring to sell milk in Missouri. Only dairies with a rating of 90 percent or higher were issued permits. It was mutually agreed that degrading by one State would call for similar action by the other. This agreement has been beneficial to both States.

In Jackson County, the disposal of the waste connected with milk production is a problem. Outside the limits of Kansas City, there are few public sewers. Dairies do not have access to these sewer systems. One large milk plant utilizes a high-rate trickling filter for the treatment of wastes, but results have not been satisfactory because of overloading and inadequate maintenance and operation. The small milk plants have no facilities for treating wastes. A simple, efficient, and inexpensive type of waste disposal system is greatly needed.

County Water Supplies

Water supply in Jackson County is primarily supplied by the municipal water plant in Kansas City, Mo., which serves the city and surrounding area through public water supply districts. There are eight such districts in Jackson County. Each district has its own board of directors. Each district has the power to vote bonds and extend the mains within its area. Water purchased from Kansas City is resold by the public water district. Thus, the municipal water plant serves about 95 percent of the population of the entire area. By this arrangement, the people of Jackson County have access to a water supply managed and operated by qualified technical personnel. Bac-

teriological samples from the eight districts are examined routinely by the Missouri Division of Health laboratories.

It would be difficult to develop individual water supplies in the county. There is no suitable underground supply except in the Missouri River bottoms, where ample water is found at a depth of 20 feet. The Missouri River forms the northern boundary of Jackson County. Sand-point-driven wells produce satisfactory water from a bacteriological standpoint. Away from the Missouri River, wells are seldom satisfactory. There are a few low-producing drilled wells, but a good drilled well is rare in the northern part of Missouri.

The water supply problem in the county is increased because the area is largely underlaid with creviced limestone, which permits little filtering action. Contamination from barnyards, septic tanks, privies, and other sources, enters the water stream through outcropping limestone ledges. Cisterns are used at many private homes and small public schools. Most of the water for these is hauled from one of the water districts. Water haulers are instructed to chlorinate each tank of water they transport. For one school with about 200 students every drop of water must be hauled. The school is otherwise completely modern, with flush toilets and a cafeteria. Several thousand dollars have been spent in unsuccessful drilling for wells. There simply is no water available in the ground.

Sewage Waste Disposal

The waste disposal problem resulting from the numerous housing developments in Jackson County presents a significant challenge to the county department. In April 1951, the Missouri Division of Health adopted a regulation for septic tank installations which requires a minimum lot area of 15,000 square feet with a minimum lot width of 75 feet, although 100 feet is preferred. This has helped to reduce the septic tank problem. The developer wishing to erect 50 or more houses is advised that he may use a lot size of 7,500 square feet if he installs a sanitary sewer system and a disposal plant. Several builders have done so. After completion, the disposal plants are maintained

and operated by the county sewer department.

A county of the first class can levy a maintenance tax for sewered areas and provide satisfactory maintenance. Counties are limited by law to one-fourth of 1 percent of the assessed valuation as the maximum that can be charged for operation and maintenance of a sewer system. A development needs at least 50 houses in order to bring in enough revenue to operate even the simplest type of disposal system.

In a subdivision of 50 to 75 houses the simplest type of sewage disposal system is a large septic tank, dosing chamber, and open sand filter. When given proper maintenance, the sand filters work very well. A sand filter requires continual maintenance and cleaning, but it produces a satisfactory effluent. Expensive to operate, the sand filter is a partial solution to the sewage problem because the disposal system is then centered at one point rather than dispersed among separate lots and individual owners.

The arrangement for the county to assume control of the sewage disposal system has worked out satisfactorily. Sometimes complaints are made that the revenue is not enough to take care of the expense, but this can be overcome largely by efficient operation. Personnel from the county health department make routine inspections of the disposal plant and report the deficiencies they find to the county sewer department.

Other Disposal Systems

There are other types of sewage disposal plants. In a development of 550 houses, a primary settling tank, separate sludge digester, trickling filter, and final settling tank have been installed to accommodate 275 houses. The system will be expanded to accommodate the ultimate capacity of 550 houses. The developer will operate the system until its completion and then deed it to the county.

The big problem, of course, is inducing the developer to put out that much money at one time. The cost, when the price of land is considered, usually will justify a community disposal system, and an appeal to the developer's pride has resulted in having some builders provide a sanitary sewer system.

Individual septic tank installations produce

many problems. The type of soil in Jackson County is not readily adaptable for the installation of soil absorption systems. A percolation rate of 10 minutes per inch is very good, but in almost all subdivision lots the percolation rate is the maximum permitted by the county, 30 minutes per inch. When the percolation rate exceeds the maximum, the builder is instructed to use some other type of system such as a sewer collection system with central treatment works or an installation of individual sand filters on each lot.

The individual sand filter creates problems too because the effluent from each filter must be carried away. In some instances a small sewer system is required. The cost of the individual filter installation exclusive of effluent drain is approximately \$150 more than that of the conventional absorption system. Numerous individual sand filters have been installed in spite of additional cost and effluent drainage problems. Builders and developers sometimes request permission to build 1 large filter to serve 5 or 6 houses, but this permission is not granted because it involves too large a maintenance problem.

However, the use of a common collection tile or sewer is permitted. It involves a minimum amount of maintenance. As yet no difficulties have been encountered with this type of drain, although some of the installations were made 5 years ago.

Jackson County has a readily available source of sand for use in sewage filters, but care in selecting the type of sand used is necessary. An effective size of from 0.6 to 0.8 millimeters, with a uniformity coefficient of less than 4, is required. Considerable labor is involved in producing sewage-filter sand. Ordinary building sand will give good results, but only for a short time because of its tendency to clog.

School Sanitation Progress

In a sprawling suburban area, the construction of schools lags behind the expanding population. Jackson County schools are overcrowded and probably will be so for some time. However, school districts are being consolidated. Gradually being eliminated are the small, one-room schoolhouses with their prob-

lems of cross-lighting, inadequate water, inadequate sewage disposal facilities, and other conditions not compatible with good health. School architects in the county have been cooperative in submitting school building plans and specifications to the health department. In reviewing the plans, the department checks the lighting, ventilation, drinking fountains, toilet facilities, accident and fire hazards, food service facilities, and water supply and sewage disposal facilities.

Schools with an enrollment of 200 to 300 students have difficult sewage disposal problems. Because most small towns lack public sewerage systems, the school has to develop its own sewage treatment plant. Usually, the installation consists of a septic tank, a dosing chamber, and an open sand filter. One public school has an absorption system with more than 5,000 linear feet of tile. Wherever possible, an open sand filter is used. With proper maintenance, very satisfactory results are obtained.

The high cost of school buildings has one advantage from the health department's viewpoint: New schools are being constructed without basements. It has been difficult to convince architects and school boards that a cafeteria or kitchen should not be placed in the basement. Newer schools now have well-lighted and well-ventilated cafeterias above-ground.

The importance of checking the complete set of school plans has been borne out by experience. Recently, an architect supplied for review only the plans of the sewage disposal system, which he thought were the only ones needed. The plans were satisfactory and provided for an absorption system of adequate capacity with a tile field in excess of 5,000 feet. However, when final inspection of the disposal system was made, it was found that the laterals were laid on top of a foundation drain. The submitted plans had not shown the foundation tile, but the complete set did. When the disposal system was constructed, the laterals were placed only a few inches above the foundation drain. As soon as the siphon discharged, the sewage seeped into the lower drain and then into the street. The contractor had to re-lay the foundation drain, removing it from beneath the laterals.

Nursing Home Inspection

In order to obtain a permit or license to operate a nursing home in Jackson County, certain minimum requirements must be met. The State legislature enacted a law regulating nursing homes in 1941. Inspection of nursing homes is the responsibility of the county health department and requires the services of the health officer, the sanitary engineer, and the public health nurse. The nursing home program includes investigation of the sanitation of the premises; patient care and treatment; record-keeping; fire, electrical, and physical hazards; food-handling practices; sources of milk and food; water supply; and sewage disposal.

One legal case involved a nursing home which was well operated and maintained but whose owners believed that they were not subject to the health department regulations. The home was not violating any sanitation regulations, but it refused to submit monthly reports, and also disapproved of health department inspection. In the ensuing litigation, the circuit court judge ruled that the State nursing home law was unconstitutional because it excluded homes healing by faith. However, the decision applies only to this home in Jackson County.

The failure of certain nursing homes to meet minimum requirements necessitated other court cases. The procedure in such instances is to inspect the home, interpret the findings to the operator, and allow sufficient time to make necessary adjustments to fulfill the requirements for licensing. At the end of this period, the home is reinspected; and then, if the recommendations have not been carried out, and there is no intention of following them, the case goes to the county prosecuting attorney.

The prosecutor writes to the nursing home operator, calling for a hearing at which the operator and a representative of the health department are present. The points in question are discussed. The prosecutor advises the operator to meet the requirements of the law. A reasonable time is given for compliance. If, at the end of that time, the operator has not complied, a warrant is issued for his arrest. Usually, the hearing concludes the matter.

The health department, of course, tries to

avoid hearings, principally because of the amount of time they take.

Taxing Trailer Residents

Along with other States, Missouri has sanitation problems peculiar to the people living in trailers. Trailer parks have presented a serious sanitation problem during World War II. The number of trailers has increased since the war. People are continuing to live in trailers. Their income frequently is high, and they choose to live in trailers not for economic reasons, but because they like it.

Almost all the sanitation problems common to a small city are found in a trailer park. Water supply, sewage disposal, garbage, and refuse disposal are the major items requiring supervision by the health department. Fortunately, all trailer parks in Jackson County are served by an approved public water supply. Where trailer parks are not served by public sewer systems, the trailer park sewerage systems consist of collection systems, septic tanks, dosing chambers, and open sand filters. In the county, there are 15 trailer parks varying in size from a 10- to 100-unit capacity. A water supply connection and a sewer connection must be provided for every trailer space.

In most instances, the older trailer parks were not properly planned, and little consideration was given to the location of waste disposal facilities. As a result of this lack of planning, there is insufficient area for waste disposal facilities and a need for pumping sewage. Odor problems are common because of the proximity of trailer spaces to the sewage filter beds. Use of chemical masking agents in sewage dosing chambers has provided some relief.

A large percentage of new trailers are equipped with showers, lavatories, kitchen sinks, and flush toilets. These improvements require sanitary sewer and water supply connections for the trailers. The central bathhouse of the typical park is rapidly disappearing. Centralized laundry facilities are, of course, still necessary. Laundry waste is treated with other sanitary sewage and has created no special problems.

Garbage and refuse collection and sewage disposal practices vary from good to bad. Ex-

perience indicates that the most satisfactory system is to provide a fly-tight metal container for each trailer unit and to accomplish disposal either by sanitary landfill or by incineration at a remote location. Most of the owner-made incinerators have not been successful. Central refuse containers require almost constant supervision to avoid abuse of the facilities.

The inherent problems of the older trailer parks created by the small unit spaces are being alleviated by the need for accommodating the new, larger trailers and the development of trailer park standards by the National Association of Trailer Coach Manufacturers.

Real estate interests and school authorities in the county strongly object to trailer parks. School authorities object because little, if any, tax revenue is obtained from the trailer occupants. A small school, or even a fairly large one, with a park of 150 trailers within its district, faces the problem of educating 50 to 75 extra pupils without adequate funds for additional space, equipment, or teaching personnel. The school board and others protest to the zoning board against a proposed trailer park and usually find a sympathetic audience.

Probably trailer park residents would not object to being taxed, but there is now no legal way in Missouri to tax them. The trailer coach manufacturers have asked the legislature for legislation to tax trailers for school purposes, but so far the State has adopted none. This problem will continue to exist until some form of legislation permits taxation of trailer occupants. (Note: The 1953 legislature passed legislation permitting counties to tax trailers for school purposes.)

The real estate interests have stated that trailer parks lower real estate values in their vicinity. But we believe that there should be a place in any county or community for well-

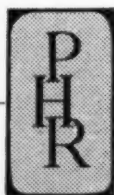
organized, sanitary trailer parks. Zoning authorities should select areas for such purposes so that there will be better trailer parks, rather than those which have just grown up from 2 or 3 trailers, adding to their original facilities in a hodgepodge fashion. Parks which are built according to a definite plan can be assets to the community. Health departments must face their obvious responsibilities toward the people who live in mobile homes.

Nuisance Adjustments

Many nuisance complaints can be adjusted during a careful interview with the complainant. Some complaints turn out to be purely personal grudges. Sometimes they are disagreements about a property line or a fence, and the health department is used as a moderator.

The first question asked the complainant is "Have you talked to your neighbor about this insanitary situation?" Generally, the answer is "No." The representative of the health department then tries to persuade the complainant to speak to the neighbor and remind him that otherwise he must sign a written complaint and perhaps testify in court.

This procedure stops many complaints before it becomes necessary even to write a letter. When a condition cannot be remedied peacefully, an inspector checks the sanitation facilities of both parties. When conditions warrant, the owner receives a letter asking him to make certain corrections and giving him a reasonable amount of time in which to do so. If the corrections are not made within that time, a hearing before the county prosecutor is requested. If the hearing fails to bring results, the case is taken to court. Actually, not many cases reach that stage.



Coxsackie Virus Antibody and Incidence of Minor Illness During the Summer

By MARY WALTON, M.D., Dr.P.H., and JOSEPH L. MELNICK, Ph.D.

THE ROLE of Coxsackie viruses in human illness is not fully understood. The existence of 16 antigenic types of these agents with varying pathogenic potential for the mouse has suggested to some that we may actually be dealing with an assembly of agents loosely grouped together rather than with members of a single family (1-5). These agents have been isolated from patients with a variety of illnesses, and evidence has been presented for identifying certain members, for example, types A2 (Fleetwood) and A4 (Texas-1), as the etiological agents of herpangina (6) and others, for example, B1 (Conn.-5) and B3 (Nancy) as those of pleurodynia (epidemic myalgia, Bornholm disease) (7, 8). Although many of these agents have been isolated

from patients simultaneously infected with poliomyelitis virus, or from flies also carrying poliomyelitis virus, the role of the Coxsackie viruses in the etiology of the disease entity known as poliomyelitis remains obscure (1, 2, 3, 9, 10). The present study was undertaken to gain further information on this group of viruses and their possible relationship to minor illnesses of poorly defined nature which are commonly seen during the summer months.

The observations presented were made as a part of the study of poliomyelitis which is being conducted in Charleston, W. Va.

Laboratory studies of the development of poliomyelitis antibodies and measurement of the incidence of acute unclassified infectious illness have been undertaken in an attempt to define more accurately the epidemiology of poliomyelitis, the pattern of which is confused by the high ratio of mild or inapparent to apparent infections. The prevalence of the Coxsackie viruses and the confusion resulting from their epidemiological similarity to the poliomyelitis viruses led us to attempt to describe the incidence of infections with these agents and to investigate the association with the incidence of summer illness in children. The events which occurred during the summer of 1951 in Charleston are described.

The Study Areas

Relatively homogeneous population groups selected on the basis of certain characteristics of environment and socioeconomic status have

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This study and the accompanying one by Dr. Melnick, Dr. Walton, and Dr. Ira L. Myers (p. 1178) were aided by a grant from the National Foundation for Infantile Paralysis.

been under continuous observation since the spring of 1950. District I in Charleston is composed of approximately 900 persons in 200 households in the north central part of the city (fig. 1). In general, the environmental sanitation is poor. The area is not provided with sanitary sewers. The common method of disposal of human excrement is the insanitary privy. A small stream runs through the area receiving surface waste from overloaded cess-pools and septic tanks and wash from the privies. The fly-breeding potential is high. Economic status is generally low. Families are rather large, averaging 4.5 persons. Housing is substandard and crowded. There appears to be ready opportunity for spread of infectious agents by either ano-oral or respiratory routes. District IV is composed of about 1,300 persons in 420 families of middle to upper-middle socioeconomic status living in the southeastern part of the city. Environmental hygiene is standard. The fly-breeding potential is low. Average family size is 3.2 persons. Housing is adequate and not crowded. Personal hygiene practices are generally good.

Methods

Incidence of acute minor illness has been measured since the spring of 1950. Morbidity data are obtained from an adult informant in each household by trained lay interviewers at 4-week intervals. Informants are questioned as to the presence or absence in each member of the household of specific symptoms beginning in the 4 weeks preceding interview. Symptoms, duration, family diagnosis, and a measure of severity are recorded. Severity is measured by the amount of interference with usual activity and is classified as "no reduced activity," "reduced activity," and "in bed." A variable but always substantial portion of illnesses reported falls into the first category. Minor illnesses in the first two groups rarely come to the attention of physicians or health agencies, and thus would not be recorded by any of the usual reporting mechanisms. Incidence rates are, therefore, not comparable with rates obtained through ordinary channels. The schedule of enumeration is arranged so that comparable samples of each population are interviewed each week. The enumerators are regularly rotated

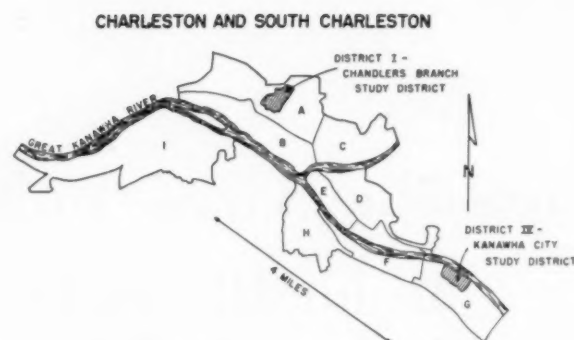


Figure 1. Location of the study areas.

to avoid bias which may result from differences between interviewers.

Laboratory data consist of measurements of complement-fixing (C-F) antibodies to each of four antigenically distinct Cocksackie viruses in paired serums collected in May and November of 1951 from the population under observation in the two districts. The method used for demonstrating antibody has been described (12). A "positive" serum is one reacting at a dilution of 1:4 or greater. A "negative" serum is one which fails to react at a dilution of 1:4. Antibodies to the following virus types were studied: B1 (Connecticut-5), B3 (Nancy), A4 (Texas-1), and A2 (Fleetwood). The classification of Cocksackie viruses has been discussed recently with a comparison of nomenclature used by Dalldorf (3), Huebner (4), and by one of us (5). A rise in C-F antibody is regarded as evidence of relatively recent infection with a Cocksackie virus (12, 13, 16). Even though there are at least 16 immunologically distinct Cocksackie viruses (5), there is evidence of crossing between them in the complement fixation reaction, so that in individual cases antibody rises to types other than the one isolated have been demonstrated (12, 13). The average time of persistence of detectable levels of C-F antibody after infection is not certain but it is known to be variable. It may persist for a year or more; on the other hand it is possible that sometimes it may be of such short duration that a rise could have occurred in some of these individuals and could have disappeared between the spring and fall bleedings (12, 13, 16).

Grab samples of sewage were collected to provide an index of Cocksackie virus infection in the community. Samples were obtained regu-

Table 1. Prevalence of C-F antibody to four types of Coxsackie virus. Paired serums from age samples of two study districts in Charleston, W. Va., 1951

Age	District I																
	Number of persons	Conn.-5 (type B1)				Type A2				Texas-1 (type A4)				Nancy (type B3)			
		Number positive		Percent positive		Number positive		Percent positive		Number positive		Percent positive		Number positive		Percent positive	
		Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1-4-----	22	6	19	27	86	3	16	14	73	5	8	23	36	4	6	18	27
5-9-----	32	19	30	59	94	7	16	22	50	17	17	53	53	13	11	41	34
10-14-----	9	8	8	89	89	1	3	11	33	6	3	67	33	3	2	33	22
Total 1-14-----	63	33	57	53	91	11	35	17	56	28	28	44	44	20	19	32	30
15+-----	20	12	13	60	65	2	4	10	19	3	4	14	19	10	6	50	30
District IV																	
1-4-----	28	3	10	11	36	7	9	25	32	3	10	11	36	2	2	7	7
5-9-----	56	24	30	43	54	17	23	30	41	33	32	60	58	11	5	20	9
10-14-----	20	6	6	30	30	3	7	15	35	14	9	70	45	6	2	30	10
Total 1-14-----	104	33	46	32	44	27	39	26	37	50	51	49	49	19	9	18	9
15+-----	42	30	23	71	55	4	9	10	22	16	13	38	31	24	11	57	26

¹ One Texas pair incomplete.

larly every 2 weeks during the winter months, and weekly, beginning in May, from lines serving the population of district IV and other residential areas in Charleston and two adjacent towns in the metropolitan area. Weekly privy samples were collected in district I beginning in May. The sewage specimens from each area were run in two pools per month. Privy specimens were run in two pools per month from each of four sections of district I. A description of the methods of collection and of testing these samples will be presented elsewhere.

Results

Table 1 and figure 2 show the prevalence of C-F antibody to the four types of Coxsackie virus in the spring and fall of 1951 in the populations in the two study districts. Only paired

specimens are included. Curves are a result of both conversion and reversion between spring and fall. Many individuals developed antibody to more than one type (table 2). It will be noted that in both districts the prevalence of C-F antibody to three types of virus rose during the summer while antibody to the fourth type, Nancy, was less prevalent in the fall than in the spring. No person developed antibody to Nancy alone. The age pattern for each type was different, both in spring prevalence and in change in prevalence between spring and fall.

Table 3 shows rates of conversion from negative to positive during the summer for each type. In both districts, the rate was highest for the Connecticut-5 type. The rate of development of antibody to both Connecticut-5 and type A2 was substantially higher in district I than in district IV. If conversion rate is an

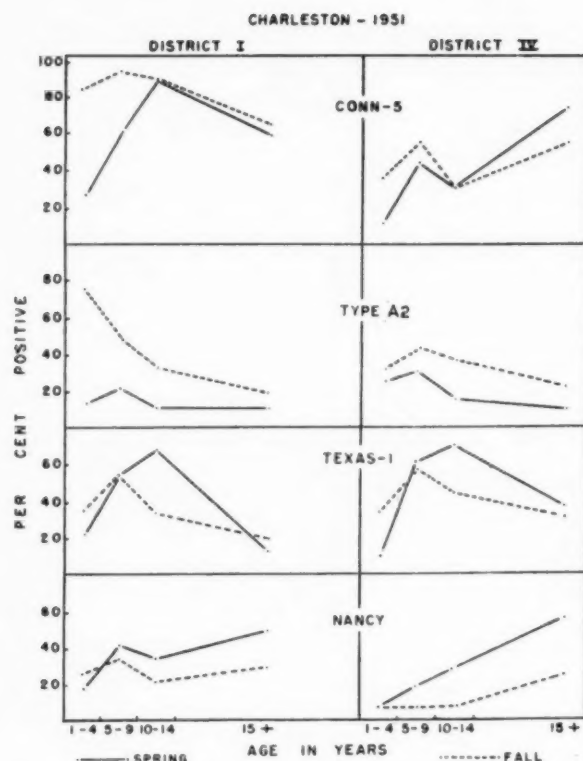


Figure 2. Age distribution of C-F antibodies to four Cocksackie viruses.

indication of extent of spread, then during the summer of 1951 Cocksackie virus spread much more extensively in district I than in district IV. Similar observations have been reported on development of C-F antibodies to the Texas-1 type virus in an urban population during the summer months and its relationship to socioeconomic status and environment (14).

The association between the development of C-F antibody, or conversion, and reported morbidity in individuals and households was investigated. In district I the conversion rate was so high that it is not possible to observe any association between morbidity and indication of the presence of infection with one or more types of Cocksackie virus during the summer period. There were only three households in which no pair of serums became positive to one of the Cocksackie viruses. Households with no conversion in Cocksackie virus antibody had no member with a negative complement fixation to Connecticut-5 in the spring. Only 1 child under 10 years of age had no C-F antibody in the spring or fall to any of the 4 types.

In district IV, the presence of households in which no individual tested developed antibody

Table 2. Number of positive C-F antibodies per person in spring and number of conversions per person during summer, 1951

Age	Number tested	District I													
		Number of positive C-F tests per person in spring					Total number with 1 or more positive C-F tests		Number of new C-F antibodies per person during summer and fall				Total with 1 or more conversions		
		0	1	2	3	4	Number	Per-cent	1	2	3	4	Number	Per-cent ¹	
1-4-----	22	10	8	3	0	1	12	55	4	7	6	0	17	81	
5-9-----	32	7	9	6	5	5	25	78	5	5	4	1	15	56	
10-14-----	9	1	2	3	2	1	8	89	1	1	0	0	2	25	
15+-----	20	6	5	5	4	0	14	70	2	3	0	0	5	25	
District IV															
1-4-----	29	21	4	2	1	1	8	28	10	3	1	0	14	50	
5-9-----	56	8	24	12	11	1	48	86	12	3	1	0	16	29	
10-14-----	20	2	10	5	3	0	18	90	5	1	0	0	6	30	
15+-----	44	8	9	15	9	3	36	82	8	0	0	1	9	22	

¹ Percent of persons with one or more negative C-F tests in spring.

Table 3. Rate of development of C-F antibodies to four Coxsackie viruses in paired serums from a sample of the population in two study districts in Charleston, W. Va., 1951

Age	District I											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)
1-4	16	14	87	19	13	68	17	4	24	18	5	28
5-9	13	11	85	25	11	44	15	4	27	19	5	26
10-14	1	1	100	8	2	25	3	0	0	6	0	0
Total 1-14	30	26	87	52	26	50	35	8	23	43	10	23
15+	8	3	37	19	2	10	18	2	11	10	1	10
Age	District IV											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)	Number negative, spring	Number positive, fall	Conversion rate (percent)
1-4	25	8	32	21	3	14	25	7	28	26	1	4
5-9	32	10	31	39	7	18	22	3	14	45	1	2
10-14	14	3	21	17	4	24	6	0	0	14	0	0
Total 1-14	71	21	30	77	14	18	53	10	19	85	2	2
15+	12	2	17	37	6	16	26	3	12	18	1	6

Rate of loss of C-F antibodies

Age	District I											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)
1-14	33	2	6	11	2	18	28	7	25	20	11	55
15+	12	2	17	2	0	0	3	1	33	10	4	40
Age	District IV											
	Connecticut-5			Type A2			Texas-1			Nancy		
	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)	Number positive, spring	Number negative, fall	Reversion rate (percent)
1-14	33	7	21	27	2	7	50	9	18	19	12	63
15+	30	9	30	4	1	25	16	6	37	24	14	58

Table 4. Reported incidence of total unclassified acute minor illness in children under 10 years of age

Month	Households with conversions ¹			Households without conversions ²		
	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)
May.....	42	8	19	39	14	36
June.....	41	5	12	36	3	8
July.....	36	9	25	30	7	23
August.....	38	19	50	32	12	38
September.....	43	14	33	39	12	31
October.....	43	27	63	38	10	26

¹ Children in 21 households in which 1 or more persons under 10 developed C-F antibody between May and November 1951.

² Children in 25 households in which no person showed rise in C-F antibody.

NOTE: All populations are average number of children present per week during the month.

permits a comparison of minor morbidity between individuals and groups who did and did not show a rise in C-F antibody to one or more of the types of Cocksackie virus tested during that season. Households in which paired serums showed rises to type 2 poliomyelitis virus

have been excluded. Since infection with a Cocksackie virus spreads in households (1, 2, 6, 10, 11, 15), the association between evidence of infection in households and incidence of illness was investigated. Table 4 shows the total incidence by month of onset of acute minor illness in children under 10 years of age in households in which one or more persons, including at least one child under 10, developed antibody to one or more of three types of Cocksackie virus compared with the morbidity reported in children in households in which serum pairs were tested for children under 10 and no development of antibody was demonstrated. Only unclassified acute minor illness has been included. The common acute communicable diseases of childhood, chickenpox, measles, and mumps, and such conditions as summer sores, impetigo, poison ivy, pinkeye, reactions to immunizations, accidents, and injuries have been excluded. The peak of summer morbidity was in August. Rates in July and September were slightly higher than those in May and June. Incidence of total minor morbidity was also high in October in children in converter households. August incidence appeared to be slightly higher in converter households but differences between the two groups were not notable.

Table 5 shows the symptoms reported in the children with an unclassified acute minor ill-

Table 5. Individual symptoms reported in August 1951 by children under 10

Type of household	Number of children	Number of illnesses	Symptoms														Severity					
			Nasal	Cough	Sore throat	Fever	Headache	General aches	Stiff neck	Pains in arms-legs	Vomiting	Diarrhea	Other	Number of symptoms	Average symptom per illness	Fever rate, percent	Sore throat rate, percent	Vomiting rate, percent	Headache rate, percent	Usual activity	Reduced activity	In bed
With conversions.....	38	19	12	7	6	13	4	0	0	0	6	4	6	58	3.0	34	16	16	10	9	3	7
With no conversions.....	32	12	7	3	1	2	3	0	0	0	1	1	3	20	1.7	6	3	3	9	6	3	3

Table 6. Illnesses with fever or sore throat reported July–October 1951 in individual children with a rise in antibody to a Cocksackie virus

	1–5 years				6–14 years			
	Conn.-5 only	Conn.-5 + Texas-1 or type A2	Texas-1 only	Total	Conn.-5 only	Conn.-5 + Texas-1 or type 2	Type A2 only	Total
Number of children.....	6	3	5	14	5	3	6	14
Number with fever or sore throat....	6	2	5	13	2	0	0	2
Fever.....	5	2	5	12	1	0	0	1
Sore throat.....	3	1	2	6	1			1
Usual activity.....	1			1	2			2
Reduced activity.....	1	1	2	4				
In bed.....	4	1	3	8				
Month of onset:								
July.....			2	2				
August.....	4	1	2	7	2			2
September.....	2	1		3				
October.....			1	1				

¹ Children who showed rises in C-F antibody to type 2 poliomyelitis virus have been excluded from both groups.

ness during the peak month of August. The symptoms listed are those regarding which specific questions were asked. Other symptoms included earache, upset stomach, and additional respiratory symptoms. There was no report of chest or pleuritic pain. A significant excess of fever was reported by children in households with conversions. Sore throat and vomiting were also present in some excess in this group. In one block in district IV, not included in the spring serum collection, type A2 Cocksackie virus was isolated in July from each of six children tested during a study of a localized excess of acute minor illness. Five of the six tested plus one household contact reported sore throat and fever. This experience is described in the accompanying report.

A summary of acute minor illnesses reported in individual children who developed antibody is shown in table 6. The children have been separated into two age groups, and illnesses are listed by type of Cocksackie virus to which C-F antibody developed. Five children, 1 to 3 years of age, developed antibody to Texas-1 only. All reported febrile illness during the interval between bleedings, 2 in July, 2 in August, and 1 in October. All were too sick for normal ac-

tivity and 3 were in bed. Two reported sore throat, 1 vomiting, and 1, the 3-year-old, complained of headache. Six children, 5 to 12 years of age, developed antibody to type A2 only. In this group no fever or sore throat was reported. Three had attacks of vomiting in October. Among the individual children 1 through 5 years of age showing a rise in C-F antibody to the Connecticut-5 virus, 7 out of 9 had a febrile illness in August or September, 4 had sore throat, 4 reported vomiting, and 3 headache. Classified by severity, one of the illnesses caused no reduction in the child's activity, two produced reduced activity, and 5 of the children were in bed. Of 8 children 6 to 14 years of age showing a rise in antibody to the Connecticut-5 virus, 1 reported sore throat and another reported fever. It is interesting to note that 13 of the 14 children of ages 1 through 5 had fever, sore throat, or both; only 1 of the 14 in the older group reported fever and 1 complained of sore throat.

Table 7 shows the number of illnesses in the children in each group of households in which fever or sore throat was reported as symptoms. There were 22 such illnesses in the children in households with conversions (average popula-

Table 7. Incidence in 1951 of unclassified acute minor illness with fever or sore throat in children under 10

Month	Households with conversions			Households without conversions		
	Num-ber	Cases	Rate (per-cent)	Num-ber	Cases	Rate (per-cent)
May-----	42	2	5	39	5	13
June-----	41	2	5	36	0	0
July-----	36	4	11	30	2	7
August-----	38	14	37	32	2	6
September-----	43	8	19	39	1	3
October-----	43	7	16	38	2	5

tion, 41) in August and September while among those in households with no conversions (average weekly population, 35) only 3 were noted. The rates for May, June, and July are similar in the two groups. In October, the difference is within chance range. The weekly incidence of illness with sore throat or fever in each group of children is shown in figure 3. Such illnesses in the children in households with antibody rise appear to be concentrated in the latter part of August (calendar weeks 33-35). There is also a little concentration in weeks 28-31, the period during which the block outbreak described in the accompanying paper occurred. As also shown in figure 3, Coxsackie virus was isolated from the sewage from District IV in the latter part of July and again in the first half of September. Pools of August collections were negative. Sewage from other areas in the community was positive intermittently from the first half of July until mid-October.

The average population under 10 years of age in district IV was about 380 during July and August. The total incidence of acute minor illness reported during this midsummer period, excluding accidents and injuries, was 28 per 100 in July and 37 per 100 in August. About 6 cases per 100 in each month were identified as mumps, impetigo, pinkeye, or other miscellaneous entities. The remainder fell into an unclassified group. The monthly

incidence of total unidentified illness and of those illnesses in which fever or sore throat was reported are shown in tables 8 and 9, compared with reported morbidity in the children in "conversion" and "no conversion" households. Rates for July are similar for the three groups. In August the children in households in which one or more developed C-F antibody reported a higher incidence of unclassified acute minor morbidity than did the whole population, especially of illnesses with fever or sore throat. These children, about 10 percent of the total population, accounted for nearly 25 percent of the total fever and sore throat incidence.

Discussion

The development of the C-F test for detection of antibody to the Coxsackie viruses has made available a tool which can be used to measure infection with these viruses in population groups. The test has the advantage of being relatively inexpensive, so that large scale observations are feasible. It lacks type specificity, however, to the point that in individual cases the type of the infecting virus cannot be determined. In spite of this limitation, the use of this technique may be of value in indicating broad epidemiological patterns of infection with this group of viruses. Combined with limited use of more specific but costlier methods of virus isolation and typing and studies of neutralizing antibody, it may permit adequate studies of the epidemiological and clinical characteristics of infection. The data presented here indicate both the usefulness and the limitations of the method.

Index of Incidence of Infection

The prevalence of Coxsackie C-F antibody in population groups should be an index of the incidence of infection during the period of average persistence of the antibody (14). The observations show that Coxsackie infection was common in Charleston prior to the first serum collection. In each district over 70 percent of persons tested had C-F antibody in the spring to one or more of the four types studied (table 2). The prevalence of antibody was not sig-

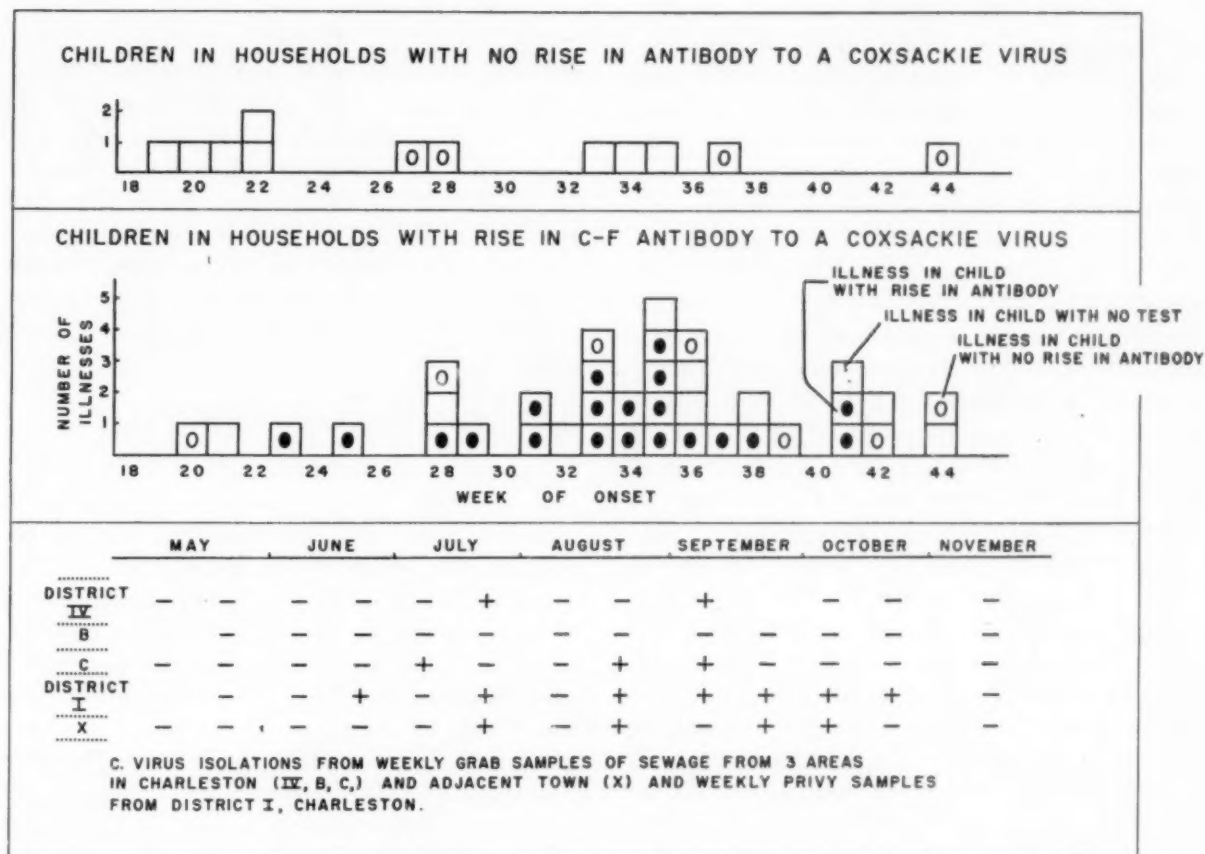


Figure 3. Weekly incidence of illness with sore throat and/or fever in households, and seasonal distribution of Coxsackie viruses in the area.

nificantly different in age groups over 4 years in either district or between the two population groups. Children 4 years of age or under in district I, the insanitary area, had C-F antibody to one or more of the viruses in somewhat higher prevalence (55 percent) than those in district IV (28 percent), an area with standard environmental hygiene. Prevalence of antibody tended to increase with age to about 14 years, after which the level remained essentially the same. It appears that infection was still taking place in the adult population. Since the average time of persistence of C-F antibody after infection is not known, and the picture is complicated by heterotypic responses, yearly incidence rates cannot be estimated. Even if detectable antibody persists longer than a year, incidence of infections with this group of agents must have been high at all ages.

Incidence of infection with a Coxsackie virus during the summer of 1951 was estimated by

study of C-F antibody to four types of virus in paired serums collected in May and November. Conversion from negative to positive is considered to be evidence of infection occurring in the interval between serum collections. Sixty-seven percent of children under 10 years of age in district I and 36 percent of children of the same age in district IV developed C-F antibody to one or more of the types studied. Conversion rates in persons age 10 and older was 25 percent in both district I and district IV. In children under 10 in district IV, 22 (73 percent) of 30 conversions were to a single type; 6 children developed antibody to 2 types and 2 children to 3 types. In district I only 9 (28 percent) of 32 conversions were to 1 type. Twelve children (38 percent) developed antibodies to 2 types, 10 to 3 types, and 1 to all 4 types. It is known that in response to infection with a 1 type of Coxsackie virus, rises in C-F antibody may occur not only to the infecting

type but also to heterologous types (12, 13, 16). The mechanism responsible for rise in heterologous antibody is not known, but it has been suggested that it may be an indication of previous infection with the type involved. This explanation could account for the greater degree of multiple rise in district I where spread of infection appeared to be more extensive.

In spite of the frequency of development of more than one antibody, the patterns of change in prevalence between spring and fall were different for each type studied. One type, Nancy, decreased in prevalence, with no rise to this type alone and reversion of over half of the spring positives to negative. It is reasonable to conclude that this type was not prevalent in Charleston during the summer of 1951. Increase in C-F antibody prevalence to a second type, Texas-1, was limited to the population under 5 years of age. Single rises occurred only in children of ages 1 to 3 in district IV and 1 adult in district I. No child under 4 in district IV and only 1 in district I had C-F antibody to Texas-1 in the spring. The conversion rate was highest in antibody to Connecticut-5 virus and occurred almost entirely in children under 15 years of age. Type A2 antibody prevalence was lowest in the spring and increased in all ages during the summer.

Whether or not one or more of the three viruses which showed increased antibody prevalence was causing infection during the summer cannot be determined from the C-F evidence. Coxsackie viruses were isolated from the sewage from both districts and from other areas in and around Charleston, but these strains have not been typed. Type A2 virus was isolated from stool specimens of 6 children with fever and sore throat and 2 household contacts in a block

in district IV which was not included in the serum collections. However, in the two study districts, children with paired serums tested showed a higher rate of development of C-F antibody to Connecticut-5 than to type A2, and single rises to both Connecticut-5 and Texas-1 occurred with no evidence of development of antibody to type A2. It is likely that at least 1 type in addition to type A2 contributed to the Charleston incidence, but whether or not either Connecticut-5 or Texas-1 were present is not known.

Morbidity and Coxsackie Viruses

The children in district IV who developed C-F antibody to one or more of the Coxsackie viruses studied and their household contacts reported more febrile illness and sore throat than were observed in households in which paired serums showed no rise in antibody. This excess in morbidity was most notable in August and September. The clinical syndrome in about half of the cases was similar to herpangina (6). The others were less specific. No chest pain or pleurodynia was reported. Seven of the 14 cases in individuals with conversion were associated with rise in antibody to the Connecticut-5 type only, and 4 with rise in Connecticut-5 plus either Texas-1 or type A2. Similarly, 4 of the 9 household contact cases were associated with rise to Connecticut-5 only and 3 with rises to Connecticut-5 plus Texas-1 or type A2. Since virus was not isolated from any of these individuals at the time of illness, it is not possible to say positively that any type of Coxsackie virus was responsible for the illnesses or the development of C-F antibody. It is interesting, however, and perhaps worthy of further investigation, that while the greatest

Table 8. Incidence of unclassified acute minor illness in children under 10 years of age, District IV, 1951

Month	All children			Households with conversions			Households without conversions		
	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)
July.....	373	79	21	36	9	25	30	7	23
August.....	388	119	31	38	19	50	32	12	37

Table 9. Incidence of unclassified acute minor illness with symptoms of fever or sore throat, District IV, 1951

Month	All children			Households with conversions			Households without conversions		
	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)	Number	Cases	Rate (percent)
July-----	373	39	10	36	4	11	30	2	7
August-----	388	61	16	38	14	37	32	3	9

number of antibody conversions were to the Connecticut-5 virus, and the association of conversion to Connecticut-5 with minor morbidity was most marked, the minor illnesses reported were herpangina-like. The Connecticut-5 virus has been suggested as one of the etiological agents of pleurodynia (7, 8). No symptoms suggestive of this syndrome were reported.

Summary and Conclusions

1. Spring and fall prevalence of complement-fixing antibodies to four antigenically distinct Coxsackie viruses in paired serums collected in the spring and fall of 1951 from two selected population groups in Charleston, W. Va., is presented with conversion rates for each age group. Each population is relatively homogeneous, but the two differ in socioeconomic status and environmental sanitation. Antibodies to the following Coxsackie virus types were studied: Connecticut-5 (B1), Nancy (B3), Texas-1 (A4), and type A2.

2. In spite of the fact that many persons showed development of antibody to more than one type of virus, each type shows a distinct and different pattern of change in prevalence between spring and fall.

3. The conversion rate for the two types which showed increase in prevalence at all ages was definitely greater in the district characterized by substandard socioeconomic status and environment.

4. In the district selected for good sanitary environment and better than average socioeconomic status, there appeared to be an association between the development of antibody to one or more of the Coxsackie viruses and the re-

ported incidence of unclassified acute minor morbidity, particularly those illnesses with symptoms of fever or sore throat in individuals and family contacts under 10 years of age.

5. The incidence of unclassified acute minor illnesses in the total population under 10 years of age in this district during August was about 31 cases per hundred. Ten percent of the children, identified by laboratory study as individuals or household contacts of individuals who developed complement-fixing antibody to one of the Coxsackie viruses, reported incidence rates higher than the rates for the total population and accounted for about 25 percent of the morbidity with symptoms of fever or sore throat.

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Isolation of a Coxsackie Virus During a Summer Outbreak Of Acute Minor Illness

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MARY WALTON, M.D., Dr.P.H.,
and IRA L. MYERS, M.D.

COXSACKIE VIRUSES have been isolated from patients with a variety of illnesses (1, 2, 3). However, the characterization of these viruses as the etiological agents of specific disease is not a simple matter. Extensive and detailed investigations were required before Huebner and his associates (4) were able to demonstrate that certain members of the Coxsackie group could induce the clinical entity known as herpangina. The fact that at least 16 antigenic types are included in the Coxsackie group (5) confuses the problem. Additional investigations combining epidemiological observations and laboratory study of specimens collected in the field are necessary to elucidate the role of these viruses in human illnesses. One such investigation is recorded here.

The observations described were made as a part of a study of the epidemiology of poliomyelitis which is being conducted in Charleston, W. Va. (See the preceding paper.) In the last week of July 1951 an unusual incidence of unclassified acute minor illness was noted in a block in one of the study areas in which households are regularly visited by in-

Dr. Myers, a commissioned officer of the Public Health Service, was assigned to the Communicable Disease Center poliomyelitis project, at Charleston, W. Va., when a part of this study was in progress. He is now with the Communicable Disease Center, Atlanta, Ga. Biographical data for Dr. Melnick and Dr. Walton will be found with the article by them on p. 1167 of this issue.

This study was aided by a grant from the National Foundation for Infantile Paralysis.

interviewers. The block is adjacent to one from which a case of poliomyelitis had been reported earlier in the week. The situation was investigated to determine whether or not the two observations were related.

Materials and Methods

Stools and paired serum samples were collected at times indicated in table 1. They were frozen at about -20°C . soon after collection and held at this temperature until tested. The methods used in the preparation of stools for testing for poliomyelitis and Coxsackie viruses, as well as the criteria for positive isolations, have been described in detail previously (6, 7, 8). For poliomyelitis virus one monkey was employed per sample, the animal being inoculated intracerebrally with a fecal extract which had been concentrated and partially purified by ultracentrifugation. Two litters of eight newborn mice each were inoculated for each test for Coxsackie virus.

Neutralization tests were carried out as described (9, 10). For the paired serums, each serum was diluted 1 to 10 and run against varying dilutions of virus. The results in table 1 are listed as the log units of type A2 Coxsackie virus (Fleetwood strain) neutralized by this dilution of serum.

The viruses isolated in this study were typed first by the plate complement fixation test as adapted to Coxsackie viruses (11) and then by neutralization with the prototype serum in order to rule out the presence of more than one strain in the isolate (5).

The Outbreak

The poliomyelitis patient, a white male 6 years of age in household 8 (see table 1) became ill on July 18, 1951, with symptoms of fever, drowsiness, nausea, and epigastric pain. He developed a stiff neck the following day. A diagnosis of poliomyelitis was made on July 20 on the basis of increased lymphocytes in the spinal fluid, stiff neck, and hamstring muscle spasm. Weakness of abdominal muscles was noted on July 21 and persisted until September 4. On July 21 his year-old brother developed fever and sore throat, at which time the attend-

ing pediatrician observed small vesicles in the throat (herpangina). On July 25 his mother reported a sore throat.

The 6-year-old poliomyelitis case played frequently with children in the adjacent study block and had attended a birthday party at the home of household 2 (see table 1) on July 4. There was no known contact with household 7.

Twelve families live in the study block. Seven were available for study. In 6 households 1 or more persons reported illness during July. Of the 10 children in these households 7 had symptoms between July 11 and 31. Six had fever and sore throat. In 2, small vesicles were seen on the first or second day of illness. The others had small superficial ulcers. The seventh reported only coryza. Morbidity reported in the block and laboratory findings are shown in table 1.

Laboratory Findings

Coxsackie virus was isolated from stools of each of six children in the study block and from the poliomyelitis patient and the younger child in that household (No. 8). By methods previously described (5) all eight strains were found to belong to type A2. The Charleston viruses reacted in the complement fixation test with type A2 serum but not with any of the other 14 prototype serums which were run simultaneously with each of the strains. Each strain was then found to be neutralized by antiserum to the prototype type A2 strain (Fleetwood). Over 100,000 doses of virus were neutralized by a 1 to 10 dilution of immune mouse serum.

One of four children from whom paired blood specimens were obtained showed a rise in titer of neutralizing antibody. No virus was isolated from stools of six adults in households with illness. All first blood specimens from the adults showed neutralizing antibody. None showed a rise in titer in convalescent blood.

Household 7 reported no illness during July. There was no known contact between children in this family and others in the block. No virus was isolated from stool specimens of 2 children and 2 adults in this family.

Poliomyelitis virus was isolated from a stool specimen from the poliomyelitis patient but not from the specimens of the sibling or from the

Table 1. Summary of morbidity and laboratory findings among certain householders in Charleston, W. Va., 1951

Household No.	Sex	Age	Symptoms		Serum				Stools		
			Date	Kind	Dates		Log of type A2 neutralization index		Date	Virus isolated	
					1st	2d	1st	2d		Type A2 Coxsackie	Polio-myelitis
1	M	30	6/23	Sore throat, fever, headache							
	F	28	7/24	Vomiting, diarrhea	7/27	9/6	4.8	4.8	8/8	0	----
	F	5									
	M	3	7/11	Sore throat, fever					8/8	+	0
2	M	37									
	F	35			8/1	9/8	4.3	3.8	8/13	0	----
	M	6	7/16	Sore throat, ¹ fever ²	7/27	9/8	5.3	5.3	8/13	+	0
	M	1	7/16	Sore throat, fever					8/13	+	0
3	M	37									
	F	34	7/25	Stiff neck ³	8/1	9/6	4.3	3.8	8/13	0	----
	F	8	7/29	Sore throat, fever, cough ⁴					8/13	Inc.	----
	M	5	7/31	Running nose	8/1	9/6	5.3	5.5	8/13	+	0
4	M	33									
	F	33	7/24	Sore throat					8/8	0	----
	M	4									
	M	2									
5	M	33									
	F	33			8/1	9/8	3.0	2.8	8/8	0	----
	M	5	7/22	Sore throat, ¹ fever	8/1	9/8	5.0	5.8	8/8	+	0
	M	2	7/25	Sore throat, fever	8/1	9/8	1.3	>6.3	8/8	+	0
6	M	33									
	F	24									
	F	20	7/19	Headache, cough					8/8	0	----
7	F	73							8/9	0	----
	M	37									
	F	35			8/1	9/11	4.3	4.3	8/9	0	----
	F	10			8/1	9/11	4.3	4.3	8/9	0	----
	F	4							8/9	0	----
8	M	34							8/8	0	----
	F	27	7/25	Sore throat	7/27	9/6	1.8	2.5	8/8	0	----
	M	6	7/18	Fever, drowsy, stiff neck, nausea ⁵	7/24	9/4	4.3	>6.3	7/24	+	+
	M	1	7/21	Sore throat, ¹ fever					8/8	+	0

¹ "Blisters in throat."

² Additional onset 7/21—fever, vomiting.

³ Additional onset 8/9—fever, stiff neck, chest and eyes ached, diarrhea.

⁴ Chest and eyes ached.

⁵ Poliomyelitis case—additional symptoms: diarrhea, epigastric pain.

children in the study block. None of three pairs of serum run showed a rise in complement-fixing antibody to type A2 poliomyelitis virus.

Discussion

An investigation was made of an outbreak of minor illness which occurred coincidentally with the onset of poliomyelitis in a child during a period of low poliomyelitis incidence in Charleston, W. Va. Only three cases were reported in this area in 1951. The study was limited to one city block in which several cases of fever and sore throat (including some patients with herpangina) occurred during July 1951. Stool samples were collected as long as a month after symptoms were first noticed. If we assume that the illness was caused by type A2 Cocksackie virus, then the fact that every child tested who had been ill was found to be excreting this virus is an agreement with previous studies on the duration of Cocksackie virus carrier states. Because the first serum sample was usually taken several days after onset, it is not surprising that antibody rises could be demonstrated only in two instances. Neutralizing antibodies develop early in Cocksackie infections (6, 9), and all patients excreting Cocksackie viruses either had a high titer of homotypic antibodies in their first serums or developed them by the time the second serums were taken.

It is noteworthy that only one household with children gave negative tests for Cocksackie virus and that the children of this household had no known contact with the children of the other families studied.

In the group of five households with children currently infected, none of the adults were found to be carriers. All adults who were tested had neutralizing antibodies to type A2 Cocksackie virus. The titer of antibody in the adults did not change during the period of observation. It was slightly lower than that in the children, which suggests that the infection of the adults might not have been of recent origin. Beeman, Cole, and Huebner have recently made extensive studies in this field and have come to conclusions with which we agree: Persons with type specific neutralizing antibody do not excrete virus when it is introduced into the household, nor is there a change in their

neutralizing antibody level. Similar observations have been made on chimpanzees exposed to Cocksackie virus by natural routes (12).

There was little poliomyelitis in Charleston in 1951 and the data show how localized poliomyelitis can be in an urban area. The minor illness in the study area could not be related to poliomyelitis infection but rather to infection with one of the Cocksackie viruses. The patient who first called our attention to this area was found to be infected with both poliomyelitis and a Cocksackie virus. Although the contacts appeared sufficient for spread of Cocksackie virus within the block, no evidence could be obtained that poliomyelitis virus spread from the patient into the block. In 1950, which was also a year of low prevalence of clinical poliomyelitis, virological data also indicate the failure of the virus to spread widely through the community. Sewage tests were carried out in 1 circumscribed area of Charleston (4,000 people on the line) in which 2 cases occurred in 1 week during September. Weekly sewage samples were negative for 11 weeks before the cases occurred, and also during the week of onset. Poliomyelitis virus was isolated from the sewage the following week. After this, the tests became negative again.

Serological data on Cocksackie infections were obtained in Charleston during the summer of 1951 from normal children who were bled in the spring and again in the fall (see accompanying study). It was found that 30/83 (36 percent) of children under 10 years of age in this study area developed increases in complement-fixing antibodies to type A2 (Fleetwood), A4 (Texas-1), or B1 (Connecticut-5) viruses and to a much less degree (2/83) to B3 (Nancy). Of the 13 children with antibody to type B3 in the spring, 8 showed no antibody in the fall. Children developing Cocksackie virus antibodies had a significantly higher incidence of fever and sore throat than children who failed to develop these antibodies. Because of the heterotypic complement-fixing antibody response occurring in Cocksackie infections, it is not possible to say which virus was responsible for the antibody increases in the Charleston children. The isolation here of type A2 Cocksackie virus from children with similar illnesses during the same period sug-

gests that the type A2 virus may well have been one of the major etiological agents for the minor illnesses prevalent in Charleston during the summer of 1951.

Summary

A localized summer outbreak, presumably of herpangina, was investigated in Charleston, W. Va., during 1951.

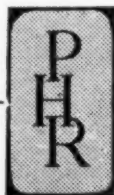
Acute minor illnesses with symptoms of sore throat and fever were reported by the sibling of a case of poliomyelitis and by 6 of 10 playmate contacts under 10 years of age living in the block across the street. Some of the children had a syndrome compatible with herpangina. Both poliomyelitis virus and type A2 Coxsackie virus were isolated from a fecal specimen from the case of poliomyelitis, and a rise in neutralizing antibody titer to type A2 Coxsackie virus was demonstrated. Stool specimens from household and playmate contacts with symptoms were found to contain type A2 Coxsackie virus but not poliomyelitis virus. Adult members of the households possessed neutralizing antibodies to type A2 Coxsackie virus. None were found to be excreting virus.

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Research Preferences and Activities Of Public Health Service Officers

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PUBLIC HEALTH SERVICE professional personnel—commissioned officers and civil service—engage in four major types of health activities: research, clinical or medical care, administrative, and public health (for example, consultation on State health programs and developing disease control programs). Research activities are both basic and applied. They are performed in laboratory, field, or clinical situations and are concerned with such problems of health and disease as etiology, therapy, and control.

Achieving the best in-Service placement in the four areas of Service activity requires

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knowledge of employees' interests and training. In the research area, the need for readily available information on work preferences was recently highlighted by the staffing requirements of the newest research programs of the Public Health Service, those operating in the Clinical Research Center of the National Institutes of Health, in Bethesda, Md.

To meet this need among commissioned personnel, a questionnaire was designed to identify the officers interested in doing research and to determine their specific interests in defined areas of investigation. As an aid to administrators in making a quick initial screening of officers who might be assigned to research activities, the questionnaire also asked each officer to indicate his years of training and experience in research and other work areas. Background characteristics of those officers who, on the basis of questionnaire responses, appear adequately prepared for research positions could then be more completely evaluated from the records of training and experience contained in the personnel files of the Division of Commissioned Officers.

This report summarizes the salient findings from an analysis of the questionnaire responses, furnishing an overview of the research activity of the Public Health Service commissioned corps and identifying its research potential as indicated by expressed work preferences. The data may also be useful to individuals dealing with that phase of the Nation's manpower prob-

lems involving the identification and utilization of research personnel. Some attention is devoted to the methods for collecting and using the information in dealing with staffing problems since these methods could be extended to other organizations and other types of personnel activities.

Methods

The research interest questionnaires and instructions for their use were mailed in May 1952 to the 2,589 regular and reserve officers who were on active duty in the Public Health Service. Followup letters were sent a month later to officers who had not returned the forms. Of the questionnaires distributed, 2,278—88.0 percent—were included in the study; 298—11.5 percent—were not returned; and 13—0.5 percent—were returned too late to be included in the tabulations.

The questionnaire was of the self-coding type. It was designed so that it could be easily and quickly completed, would yield the complex information desired, and would furnish information that could be processed by machine tabulation methods.

Information from the questionnaires was disseminated to employers of officer research personnel in the Public Health Service through the compilation of three listings. The listings were arranged to answer the three major questions which these employers could be expected to ask: Who are the officers interested in doing research? On what disease or condition would each officer prefer to work? In what discipline or field is each officer most interested in working?

To answer the first question, officers were grouped according to their responses to the questionnaire—not interested in research, satisfied to do research, glad to do research, and preferring research to any other field. The second and third questions were answered by grouping officers according to their first research choices indicated from a list of 134 diseases or conditions and 197 disciplines or fields. Write-in first choices were listed separately. Within each of the 3 listings, officers' names were arranged first by profession, then by rank, and last, alphabetically within rank.

The prepared listings thus enable Service employers to locate rapidly individuals who might possibly fill research vacancies. By consulting the listing arranged by first choice of disease or condition, they can immediately locate the names of all officers in the Public Health Service who are interested in doing research on, for example, malignant neoplastic diseases. At the same time, they can see which officers have had sufficient training and experience to warrant further consideration by a review of their personnel files.

General Interest in Research

In considering the statistical results from the study, it is well to bear in mind that the data are based on officers' evaluations of their own training, research interests, and current activities. The generalizations which may be derived from an analysis of questionnaire responses could differ somewhat from those which might be made in other types of appraisals of current officer research potential and activities. Further, the current research interests reported by officers are not to be regarded as immutable. While it may be assumed that interests in broad occupational areas in the health field, such as medical care, public health, or research, will remain fairly constant, expressed specific interests may be influenced by such factors as an officer's present assignment or his estimation of future needs of the Public Health Service.

Where available, comparative percentages of other groups engaged in research are included in this report. Strict comparisons of the Public Health Service group with other groups cannot be made since conditions under which information was obtained were not necessarily the same and since Service officers could possibly constitute a part, though a small proportion, of some of the other groups. The comparative data, however, may be helpful in providing a frame of reference for the material in this report.

Research Potential

Summary data on officers' research interests and activities are presented in table 1. From this table, it may be seen that 27 percent of officers in the study report that they are cur-

rently engaged in research. Most of these, 24 percent of the total group, say that they are in research and like it. Only 3 percent of all the officers indicate that they are currently engaged in research and are not satisfied with their present type of assignment. Of the officers included in the study, 73 percent state that they are not in research assignments; 31 percent indicate that they are not in research assignments but would be satisfied or glad to do research. As measured in terms of expressed interest, this 31 percent represents the personnel research potential of the commissioned corps. If, then, new research vacancies occur, either because of expanding research activities

or because of transfer of officers in research to other activities, this group of 712 commissioned officers can be evaluated for research assignments.

The 42 percent who say they are not performing research and do not wish to do so may be eliminated from consideration for research activities. These officers are needed in the public health, medical care, and administrative functions in which they may be presumed to be interested.

Comparison of Categories

The categories with the highest proportion of officers reporting they are currently engaged in

Table 1. Officers' current¹ research activity and preference

Commissioned officer categories ²	Preferring research		Not preferring research		Total doing research	Total not doing research	Total pre-ferring research	Total not pre-ferring research	Total answering
	Doing	Not doing	Doing	Not doing					
	Number								
Scientist.....	112	24	1	4	113	28	136	5	141
Veterinarian.....	13	3	0	6	13	9	16	6	22
Sanitarian.....	75	49	2	71	77	120	124	73	197
Medical.....	244	382	27	475	271	857	626	502	1, 128
Sanitary engineer.....	54	88	6	104	60	192	142	110	252
Nurse.....	24	77	9	104	33	181	101	113	214
Dental.....	20	55	8	125	28	180	75	133	208
Dietitian.....	1	9	3	28	4	37	10	31	41
Pharmacy.....	4	20	1	33	5	53	24	34	58
Therapy ³	0	5	1	11	1	16	5	12	17
Total.....	547	712	58	961	605	1, 673	1, 259	1, 019	2, 278
	Percentage of category								Percent-age of total
Scientist.....	79.4	17.0	0.7	2.8	80.1	19.9	96.5	3.5	6.2
Veterinarian.....	59.1	13.6	0	27.3	59.1	40.9	72.7	27.3	1.0
Sanitarian.....	38.1	24.9	1.0	36.0	39.1	60.9	62.9	37.1	8.6
Medical.....	21.6	33.9	2.4	42.1	24.0	76.0	55.5	44.5	49.5
Sanitary engineer.....	21.4	34.9	2.4	41.3	23.8	76.2	56.3	43.7	11.1
Nurse.....	11.2	36.0	4.2	48.6	15.4	84.6	47.2	52.8	9.4
Dental.....	9.6	26.4	3.8	60.1	13.5	86.5	36.0	63.9	9.1
Dietitian.....	2.4	22.0	7.3	68.3	9.8	90.2	24.4	75.6	1.8
Pharmacy.....	6.9	34.5	1.7	56.9	8.6	91.4	41.4	58.6	2.5
Therapy ³	0	29.4	5.9	64.7	5.9	94.1	29.4	70.6	.7
Percentage of total number answering.....	24.0	31.3	2.6	42.2	26.6	73.4	55.3	44.7	100.0

¹ At time of completing the questionnaire.

² There are 10 major categories of commissioned officers in the Public Health Service; 2 categories, scientist and sanitarian, are each subdivided into a number of professions.

³ Physical and occupational.

research are the categories of scientist—80 percent, veterinarian—59 percent, and sanitarian—39 percent (see table 1). The scientist and sanitarian categories of the Service are composed of a number of scientific professions (1). Because of the small numbers of officers in each profession in these two categories, percentages engaged in research are based on all professions within each category.

Of the scientific professions represented in the scientist and sanitarian categories of the Public Health Service, data are available on the research activity in certain of these professions in this country (2-4). With respect to the members of these professions who have the doctorate, as is required of scientists in the Service, 55 percent of the chemists, 42 percent of the physicists, and 12 percent of the psychologists report that they are engaged in research. With regard to professional groups in this country who have the degrees required for the sanitarian category—in this category the master's degree is required for commissioning in the Regular Corps and the bachelor's for the Reserve Corps—the following data on percentages engaged in research are available (2-4): chemists with the master's degree—49 percent, with the bachelor's degree—41 percent; physicists with the master's—44 percent, with the bachelor's—61 percent; psychologists with the master's—12 percent. (Psychologists with the bachelor's degree are usually not eligible for research positions.) In all degree levels, 51 percent of chemists in government and 71 percent of physicists in government report that they are engaged in research.

The 59 percent of veterinarian officers reporting research activity suggests that the work of Service veterinarians differs from that of other groups of veterinarians. An estimated 7 percent of the veterinarians in the United States are engaged in teaching and research, exclusive of the approximate 1 percent who are doing research in the Federal Government and in commercial organizations.

Of Service officers engaged in research, the medical (24 percent) and sanitary engineer (24 percent) categories contain the inbetween percentages. Medical officers engage in all four types of Service activities—research, medical care, public health, and administrative. Sani-

tary engineer officers engage in all except medical care. Data are not available on the research activity of physicians in this country. A greater percentage of Public Health Service sanitary engineers, however, state they are doing research than do sanitary engineers in general. Only 2 percent of the sanitary engineers in this country report that they are engaged in research (5).

Authoritative estimates are available on the percentages of all engineers and scientists combined who are engaged in research in this country. About 25 percent of engineers and scientists were in research in 1952, and about 35 percent of engineers and scientists in the Federal Government were engaged in research in 1951 (6). Keeping in mind the previously mentioned reservations concerning comparisons of Service and other groups, one may note that 42 percent of Service officers in the combined scientist, sanitarian, and sanitary engineer categories are engaged in research.

It is easy to understand why relatively small proportions of nurse (15 percent), dental (14 percent), dietitian (10 percent), pharmacy (9 percent), and therapy (6 percent) officers are engaged in research in the Public Health Service. Officers in these professions are usually employed for medical care, public health, and administrative assignments. Informed estimates are available on the percentages of some of these professions that are engaged in research in the United States. Presumably, these indicate that a higher proportion of Service officers in these professions engage in research than do members of these professions in general. Nurse researchers are as yet few in number. Approximately 1.5 percent of the members of the American Dietetic Association are doing full-time research. About 4 percent of the members of the American Pharmaceutical Association are actually engaged in research, and an estimated additional 1 percent are engaged in teaching and research.

Considering officers' preferences for research, it may be seen that the order of the percentages of officers within each category preferring research closely parallels that of the percentages within each category doing research (see table 1). There are large differences between categories in the proportion of officers preferring

research. As is to be expected, scientist officers are the most research-minded group: 97 percent prefer research. Next in order are the veterinarian, sanitarian, sanitary engineer, and medical officers.

Preferred Areas of Research

The specific areas in which research-interested officers would like to work were determined by asking officers to indicate their preferences for various kinds of research operation, such as laboratory or clinical, and for various disciplines or fields of study. Preferred areas of research are summarized in table 2 in which the 197 disciplines originally listed for use with the questionnaire have been grouped in 8 general fields.

Of the total number of officers interested in performing research, most show preference for these types of research operation: clinical in-

vestigation (20 percent), combined laboratory-clinical (16 percent), laboratory (16 percent), laboratory-field (12 percent), and field (12 percent). Relatively little interest is shown in such types of research as the combined field-clinical (6 percent), administrative (5 percent), and statistical surveys and analyses (2 percent).

The highest preferences by discipline are in the medical (43 percent), biological-medical (15 percent), engineering-sanitation (14 percent), and biological (12 percent) fields. The pattern of discipline preferences fits fairly closely that of preferences for operational areas. This is to be expected since many disciplines tend to fall into specific operational areas. As examples, research in the medical field is likely to be in a clinical area of operation, and biological-medical research is likely to be in a combined laboratory-clinical area.

Table 2. Commissioned officers (1,259) preferring¹ to do research in various operational areas and in various disciplines

Research preference	Total group		Doing research		Not doing research	
	Number	Percent	Number	Percent	Number	Percent
<i>Operational area</i>						
Clinical.....	248	19.7	43	7.9	205	² 28.8
Laboratory-clinical.....	207	16.4	81	14.8	126	² 17.7
Laboratory.....	204	16.2	175	32.0	29	² 4.1
Laboratory-field.....	154	12.2	83	15.2	71	² 10.0
Field.....	147	11.7	52	9.5	95	² 13.3
Research-administration.....	112	8.9	52	9.5	60	² 8.4
Field-clinical.....	69	5.5	15	2.7	54	² 7.6
Administrative.....	66	5.2	31	5.7	35	² 4.9
Statistical surveys.....	22	1.8	6	1.1	16	² 2.2
Not stated.....	30	2.4	9	1.6	21	² 3.0
Total.....	1,259	100.0	547	100.0	712	100.0
<i>Discipline or field</i>						
Medical.....	544	43.2	155	28.3	389	² 54.6
Biological-medical.....	192	15.2	101	18.5	91	² 12.8
Engineering-sanitation.....	179	14.2	70	12.8	109	² 15.3
Biological.....	149	11.8	101	18.5	48	² 6.7
Chemical.....	76	6.0	69	12.6	7	² 1.0
Physical.....	27	2.1	14	2.6	13	² 1.8
Social.....	19	1.5	9	1.6	10	² 1.4
Mathematical-statistical.....	5	.4	5	.9	0	² 0
Other.....	44	3.5	16	2.9	28	² 3.9
Not stated.....	24	1.9	7	1.3	17	² 2.4
Total.....	1,259	100.0	547	100.0	712	100.0

¹ First choice.

² Differences between those doing and not doing research are significant at the 1-percent level.

³ Differences between those doing and not doing research are significant at the 5-percent level.

Preferences of the research-interested officers who state that they are currently engaged in research are different from those of officers who are not in research. In areas of research operation, the former group definitely prefers laboratory research (32 percent), a combination of laboratory and field (15 percent), and laboratory and clinical combined (15 percent). Officers not doing research lean toward clinical investigations (29 percent). Combined laboratory-clinical (18 percent), field (13 percent), and combined laboratory-field (10 percent) are next in order of preference (see table 2).

In the discipline choices, research-interested officers not in research are significantly more interested in the medical field (55 percent) than are the officers doing and preferring research (28 percent). Significantly more of the latter group, those who perform and prefer research, however, show interest in the biological-medical, biological, and chemical fields. Preferences for the engineering-sanitation and remaining fields are fairly close for the two groups.

Preference differences of officers reporting that they are currently in research and those not in research may be partly accounted for by the fact that proportionately more scientist, sanitarian, and veterinarian officers who prefer research are engaged in it than are medical officers who prefer research. By reference again to table 1, one may see that of the 547 officers preferring and doing research, 200 (37 percent) are in the scientist, veterinarian, and sanitarian categories, and 244 (45 percent) are in the medical category. By contrast, of 712 officers preferring but not doing research, only 76 (11 percent) are in the first 3 categories, while 382 (54 percent) are in the medical category. It is not surprising, then, that a higher percentage of officers who are interested in research but are currently not engaged in this activity would like to work in the medical or clinical areas than would officers interested in and now doing research.

The preferences in disciplines and areas of research operation expressed by the total group of research-interested officers reflect to some extent the professional composition of the Public Health Service. If it is presumed that the

professional structure within the Service has developed from the activities and needs of the Service, then it is not surprising that the expressed preferences of the group studied fit well the present and anticipated work of the organization. In the past, laboratory, combined laboratory-field, and laboratory-clinical types of studies have tended to receive emphasis. With the opening of the Clinical Research Center in July 1953, an increase in the clinical type of investigation and more opportunity for integrated laboratory-clinical work can be expected.

Preferred Research Problems

One part of the questionnaire asked officers interested in research to describe in narrative form the kind of research problem on which they would like to work. These descriptions are available to Service employers of research personnel. In addition, more general information on preferred research problems was obtained from the choices that the officers indicated for diseases or conditions on which they would like to do research. The disease research preferences for those officers expressing interest in doing research are shown in table 3. For the table, the list of 134 diseases or conditions used with the questionnaire has been divided into 19 general groups based on a modification of a standard classificatory system (7).

A comparison of the preferences indicates that proportionately more officers not doing research than those in research prefer to work on problems dealing with psychological disorders, diseases or conditions of the respiratory system, and organs of special sense. A greater proportion of those indicating that they are in research than of those not in research would like to investigate infections by lower organisms, infections by higher plants or animal parasites, and disorders of metabolism, growth, or nutrition. Generally, however, there is good agreement between the disease work preferences of the two groups of officers.

The 1,259 officers interested in research prefer to work on the following diseases or conditions as classified in table 3: vectorborne diseases (13 percent), infection by lower organism (11 percent), psychological disorders (9 percent), car-

Table 3. Commissioned officers (1,259) preferring¹ to do research on various diseases and conditions

Diseases or conditions ²	Total group		Doing research		Not doing research	
	Number	Percent	Number	Percent	Number	Percent
Vectorborne diseases, general.....	165	13.1	80	14.6	85	11.9
Infection by lower organism ³	136	10.8	76	13.9	60	⁴ 8.4
Psychological disorders.....	108	8.6	23	4.2	85	⁴ 11.9
Cardiovascular system.....	107	8.5	37	6.8	70	9.8
New growths ³	104	8.3	45	8.2	59	8.3
Digestive system.....	100	7.9	39	7.1	61	8.6
Diseases of body as a whole, general ³	73	5.8	38	7.0	35	4.9
Disorder of metabolism, growth or nutrition ³	62	4.9	36	6.6	26	⁵ 3.7
Due to trauma or physical agent ³	44	3.5	17	3.1	27	3.8
Nervous system.....	38	3.0	20	3.7	18	2.5
Infection by higher plant or animal parasite ³	37	2.9	23	4.2	14	⁵ 2.0
Musculoskeletal system.....	25	2.0	9	1.6	16	2.2
Hemic and lymphatic system.....	22	1.7	10	1.8	12	1.7
Respiratory system.....	19	1.5	4	.7	15	⁵ 2.1
Endocrine system.....	19	1.5	9	1.6	10	1.4
Urinogenital system.....	11	.9	5	.9	6	.8
Due to intoxication ³	12	.9	8	1.5	4	.6
Organs of special sense.....	8	.6	1	.2	7	1.0
Animal diseases.....	1	.1	0	0	1	.1
Other ⁶	73	5.8	37	6.8	36	5.1
Not stated.....	95	7.5	30	5.5	65	9.1
Total.....	1,259	100.0	547	100.0	712	100.0

¹ First choice.

² Where not mentioned, the words "diseases or conditions of" may be understood, for example, "Cardiovascular system, diseases or conditions of."

³ Classified under "Diseases of the body as a whole," but considered separately here.

⁴ Difference between those doing and not doing research is significant at the 1-percent level.

⁵ Difference between those doing and not doing research is significant at the 5-percent level.

⁶ Diseases or conditions not in list but written in as first choice.

diovascular system (9 percent), new growths (8 percent), and the digestive system (8 percent). These preferences coincide to a considerable degree with the various kinds of research in which the Public Health Service is engaged, as for example, studies of vectorborne diseases and infections by lower organisms at the National Microbiological Institute, Rocky Mountain Laboratory, Communicable Disease Center, and Environmental Health Center; psychological disorders at the National Institute of Mental Health; diseases of the cardiovascular system at the National Heart Institute; new growths at the National Cancer Institute; and diseases and conditions of the digestive system at the National Institute of Arthritis and Metabolic Diseases. Officer preferences for research on psychological disorders, cardiovascular diseases, and new growths also fit well the anticipated work of the new Clinical Research Center.

Training and Experience

The questions on training and experience were designed not to duplicate personnel records but to make information relevant to the screening of research officers easily available. The information supplied by officers interested in doing research is summarized in table 4. These officers were grouped into areas according to the functions in which they had advanced training and professional experience regardless of their professions or occupations. Since each officer could indicate training or experience in more than one area, the percentages given are the percentages of all officers marking that area.

More than half (56 percent) of the officers interested in and doing research reported advanced or specialized training in the research area, while only 18 percent of those interested in but not doing research stated they had such

Table 4. Advanced or specialized training and professional experience of 1,259 commissioned officers interested in doing research

Functional area	Total group (1,259 officers)				Doing research (547 officers)				Not doing research (712 officers)			
	1 year or more		None		1 year or more		None		1 year or more		None	
	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent	Num-ber	Per-cent
<i>Training</i>												
Research.....	436	34.6	823	65.4	305	55.8	242	44.2	131	¹ 18.4	581	81.6
Public health.....	266	21.1	993	78.9	100	18.3	447	81.7	166	² 23.3	546	76.7
Clinical.....	206	16.4	1,053	83.6	88	16.1	459	83.9	118	16.6	594	83.4
Administration.....	63	5.0	1,196	95.0	24	4.4	523	95.6	39	5.5	673	94.5
Statistics ³	43	3.4	1,216	96.6	25	4.6	522	95.4	18	² 2.5	694	97.5
<i>Experience</i>												
Research.....	700	55.6	559	44.4	478	87.4	69	12.6	222	¹ 31.2	490	68.8
Clinical.....	675	53.6	584	46.4	240	43.9	307	56.1	435	¹ 61.1	277	38.9
Public health.....	495	39.3	764	60.7	185	33.8	362	66.2	310	¹ 43.5	402	56.5
Administration.....	417	33.1	842	66.9	163	29.8	384	70.2	254	² 35.7	458	64.3

¹ Difference between officers doing and not doing research is significant at the 1-percent level.

² Difference between officers doing and not doing research is significant at the 5-percent level.

³ Statistics is a method used by many officers, but it is the major functional area of only a few commissioned officers in the Public Health Service; therefore, it is included under training but not under experience.

training. A sizable portion (44 percent) of officers interested in, and currently engaged in, research indicate no advanced training in research. These officers, however, have had to satisfy the basic academic and professional training requirements of their profession, such as the doctorates in medicine, dentistry, and veterinary medicine, in order to be eligible for the commissioned corps. While such training does not necessarily equip these officers for research, proficiency in research may be gained in positions offering adequate opportunities and supervision. Although not shown in table 4, it is noteworthy that 44 percent of research-interested officers engaged in research have advanced degrees beyond those required for commissioning while 29 percent of those not in research have such degrees. The percentage difference is significant at the 1 percent level.

The total group of officers expressing interest in research have obtained most of their advanced training in three areas: research (35 percent), public health (21 percent), and clinical medicine (16 percent). These officers lack advanced or specialized academic training in administration (5 percent) and statistics (3

percent). It is likely that many of them have received some training in statistics but did not consider it advanced or specialized. It is doubtful, however, that many have had much advanced academic training in administration.

That research experience is also an important differential factor in the background of those officers performing research may be seen from studying table 4. Of the officers expressing interest in research, a markedly higher proportion of officers engaged in research than of those not in research have had 1 or more years of research experience inside or outside the Service—87 percent as contrasted with 31 percent. Those research-interested officers who indicate that they are not in research have a higher proportion of clinical experience (61 percent) than do those in research (44 percent). The group interested in but not doing research also has higher percentages of officers with public health experience and administrative experience.

Summary

The foregoing demonstrates the feasibility of determining the research and other interests and qualifications of an organization's person-

nel by questionnaire and statistical methods. It describes how such information may be made conveniently available to those who utilize research personnel.

Public Health Service officers are a research-minded group. The numbers discovered who report that they are interested in, but are not doing research, now constitute a known research personnel potential of the commissioned corps.

Regardless of their present assignment, officers interested in research prefer clinical, laboratory-clinical, and laboratory types of investigations in medical, biological-medical, engineering-sanitation, and biological fields. They are interested in doing research on a number of different diseases or conditions and show the greatest preference for research on vectorborne diseases (general), infections by lower organisms, psychological disorders, diseases of the cardiovascular system, and new growths.

It is of significance that officers who are interested in research activities, and who are already in the research field, have had more advanced or special training in research, more degrees beyond those required for commissioning in the commissioned officer corps, and more research experience than officers who are interested in, but are not engaged in, research.

ACKNOWLEDGMENTS

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Public Health Service Advisory Councils

Dr. Howard A. Rusk, chairman of the Department of Physical Medicine and Rehabilitation, New York University College of Medicine, has been appointed a member of the National Advisory Arthritis and Metabolic Diseases Council. The Council's recommendations are the basis for Public Health Service research grants in arthritis and metabolic diseases. Dr. Rusk, internationally known for his work in the field of rehabilitation, and for medical articles,

includes among his activities the chairmanship of the Health Resources Advisory Committee of the Office of Defense Mobilization and the chairmanship of the National Advisory Committee to the Selective Service System. Since 1946, he has been an associate editor of the *New York Times*. In 1952, he received the Lasker Award of the American Public Health Association, and in 1953, the Dr. C. C. Criss Award for his work in rehabilitation.

Studies on Dental Care Services For School Children

—First and Second Treatment Series, Woonsocket, R. I.—

By FRANK E. LAW, D.D.S., M.P.H., CARL E. JOHNSON, D.D.S.,
and JOHN W. KNUTSON, D.D.S., Dr.P.H.

THE WOONSOCKET, R. I., school dental service program provides information on how the problems of accumulated and maintenance dental care needs of school children were met in a specific segment of the population. A cooperative study project of the city of Woonsocket, the Rhode Island State Department of Health, and the Public Health Service, the program was designed to supply complete dental services, except orthodontics, to all school children enrolled in kindergarten through the ninth grade of the public and parochial schools, provided treatment was requested by a parent or guardian.

The Woonsocket study was similar in purpose and procedures to a study conducted in

Richmond, Ind., between December 1946 and December 1951 (1). Possible regional variations in the size of the dental care problems and in the resources available suggested comparative studies to determine the magnitude of these variations and methods of overcoming them. Dental caries prevalence proved to be one-third greater in Woonsocket than in Richmond and missing tooth rates almost twice those in Richmond. About the same amount of dental care in proportion to need (F/DMF) had been received by the children in each city prior to the initiation of the programs.

Woonsocket, a fairly representative New England industrial community in northern Rhode Island, was chosen as the location for this study for several reasons. Its relatively stable population of approximately 50,000, 99 percent of whom are white with French-Canadian stock predominating, provided between 6,000 and 7,000 school children for the study. The program had the official approval and cooperation of the Rhode Island State Department of Health, the city authorities, the State and local dental societies, and the public and parochial school systems. A relatively high dental caries attack rate is common in this region (2).

Planning of the program, purchase of equip-

Dr. Law, regional dental consultant for Region III of the Department of Health, Education, and Welfare, directed the dental research program in Woonsocket, R. I., from 1945 to 1948. Dr. Johnson, now a member of the staff of the Public Health Service outpatient clinic in New York City, was a member of the Woonsocket program staff from 1945 to 1948 and directed the program from 1948 to 1952. Dr. Knutson, an Assistant Surgeon General, is the chief dental officer of the Public Health Service.

ment, selection of space, and preparation of clinic rooms were begun in the fall of 1945. The first clinics were opened on January 14, 1946, and the study was concluded 6¾ years later.

Since the majority of dental defects in any group of children results directly from dental caries, this study, like the one in Richmond, was concerned principally with caries prevalence and the treatment services required to correct carious defects. To facilitate comparison between the studies in the two cities, the data on the Woonsocket study are presented in a pattern similar to that used in the Richmond report.

Clinic Facilities and Personnel

Dental clinic rooms were selected and prepared with the necessary plumbing and electrical outlets in 24 of the city's 27 schools: 15 public, 8 parochial, and 1 orphanage. The size of the clinics varied from 2 to 7 dental chairs, depending upon school enrollment and the space available. In most schools, attractive, well-lighted rooms were provided, although in two small elementary schools, it was necessary to put up temporary partitions in classrooms.

Two modern standard dental units, 2 junior chairs, 2 operating stools, and an instrument cabinet containing duplicate sets of instruments were the basic equipment for each dentist. Operating lights on the units, an X-ray machine, sterilizer, and additional equipment completed each dental clinic. The arrangement of the equipment and the provision of adequate auxiliary personnel encouraged each dentist to work from a seated position at all times. These working conditions were designed to reduce fatigue and to improve the quality and quantity of the dentists' services (3).

Organization and scheduling was planned to maintain 3 clinics in operation throughout the school system at one time. When dental treatment was completed in one school, the equipment, supplies, and personnel were transported to the clinic room in another school. The average clinic was dismantled, transported, and set up ready for use in the next school in approximately 1½ days.

Project personnel included 4 to 7 dentists, 1 or 2 dental hygienists, 8 dental assistants, 1 fol-

Table 1. Age distribution of all children examined, by patient status, first and second treatment series, Woonsocket, R. I.

[Number of children]

Age last birthday	1st treatment series			2d treatment series		
	Patient status		All children	Patient status		All children
	Clinic	Private		Clinic	Private	
All ages...	5,944	904	6,848	5,189	918	6,107
5-----	464	53	517	220	35	255
6-----	696	81	777	624	88	712
7-----	669	69	738	634	94	728
8-----	594	61	655	613	94	707
9-----	624	77	701	559	75	634
10-----	573	57	630	608	87	695
11-----	580	82	662	482	67	549
12-----	544	85	629	500	115	615
13-----	467	96	563	419	110	529
14-----	439	135	574	344	93	437
15-----	265	90	355	160	52	212
16-----	29	18	47	26	8	34

lowup worker, 1 secretary, and 3 clerks. The dental hygienists gave prophylaxis and topical fluoride applications. The followup worker checked on treatment certificates from patients of private dental practitioners, encouraging these as well as clinic patients to obtain complete treatment. In addition, she transported to a clinic children needing emergency treatment or children whose treatment had not been completed when the clinic was moved, and she delivered supplies. The secretary cared for the central office and supply room. A clerk was assigned to each clinic to handle records, maintain the flow of patients, and perform related duties as required. An average of 1½ dental assistants for each dentist was on duty in each clinic.

The 8 dental assistants employed at the start of the study received 10 weeks of intensive training at the Naval Dental School in Bethesda, Md. They in turn helped to train assistants employed as replacements from time to time as the study progressed. The entire staff received inservice training at irregular intervals from each of the seven dental consultants

to the program, who also served the Richmond project. The consultants were experts in pedodontics, dental materials, and the use of auxiliary personnel.

Clinic Routine

Before a clinic was installed in a school, dental examination records were obtained for the entire school population. Teachers issued "request for treatment" slips to all pupils with instructions to return them signed by a parent or guardian, indicating whether he wanted the child's dental care provided in the school clinics or in the offices of the family dentist. Care in the school clinics was requested for about 85 to 87 percent of the children enrolled.

The dental-care program was divided into four consecutive treatment series. A treatment series consisted of dental examination of the total enrollment, kindergarten through junior high school, and completed treatment of all children whose parents requested treatment. This report is limited to the first and second treatment series for children receiving care in the school dental clinics.

Examination

Complete dental examinations of all children were made in each school. Examinations were made with a No. 4 plain mouth mirror and sharp No. 5 double-end explorers. X-rays were used whenever there was any doubt about clinical diagnosis.

The following information was recorded on examination records maintained for each child during each treatment series:

- Number of primary and permanent teeth erupted and unerupted.

- Number of teeth missing because of extraction.

- Number of teeth indicated for extraction.

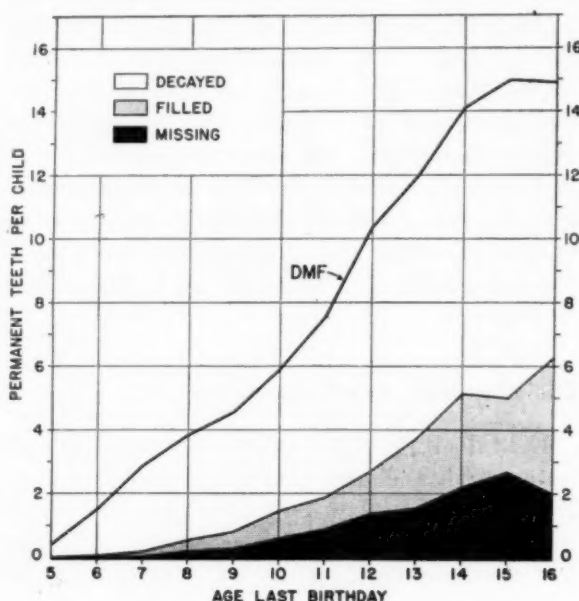
- Number of roots remaining.

- Number of unfilled carious teeth and the surfaces involved.

- Number of filled teeth and the surfaces restored.

Observations were made on all teeth present in the mouth. Teeth recorded as carious were those which showed actual cavities, no matter

Figure 1. Dental caries prevalence in permanent teeth, first treatment series, Woonsocket, R. I., ages 5-16.



how small, as well as deep pits and fissures in which the explorer penetrated with pressure and resisted removal.

A dental assistant recorded the information on the record cards in code to facilitate transfer to punch cards for processing and analysis. A serial number was assigned to each child for the duration of the study project. A master card index system was maintained to simplify reference to a child's previous dental record.

Treatment

Once the examinations had been completed, clinical treatment was given to all children whose parents had signed consent slips. During treatment the children received chairside instruction in oral hygiene.

Clinics were operated on a year-round basis, with appointments for treatment continuing during vacations and holidays. Young children were treated in the early forenoon and the older children received the later appointment times. Extractions were generally avoided during a child's first dental experience. Efforts were made to complete all operative treatment in the teeth of at least 1 mouth quadrant during a single sitting. Treatment periods varied from 15 to 30 minutes for younger chil-

dren and from 15 minutes to 1 hour for the older children.

The types of treatment included:

Permanent fillings (amalgam and silicate cement).

X-rays as required during treatment.

Vital partial pulpectomies of permanent and primary teeth.

Root canal therapy of permanent anterior teeth.

Extractions.

Treatment of periodontal diseases.

Prophylaxis.

Topical fluoride applications.

Polishing of fillings.

The amount and type of treatment given each child were noted on the record cards. Each dentist and dental hygienist recorded all of their clinical services on daily work sheets. At the end of each 10-day working period these sheets were combined in a biweekly report showing an accurate running account of services performed during the study project.

During the first treatment series, a total of 6,848 children, 5 through 16 years of age, representing 96.5 percent of all children in kindergarten through the ninth grade, received dental examinations; 5,944, or 87 percent of those examined, requested and received dental treatment in the school clinics. In the second treatment series 6,107 children in the above age groups, or 99.7 percent of the total, were examined; 5,189, or 85 percent, of these requested treatment in the dental clinics. About 2,500 children received initial care in the second treatment period. The number of children not receiving care in the school clinics was essentially the same in both series (table 1).

Comparison of Caries Prevalence

The average annual increment of decayed permanent teeth, estimated from the difference in prevalence rates at individual ages, was 1.31 teeth per child in the first treatment series and 1.43 teeth per child in the second.

To measure and express the workload for this study adequately, all teeth requiring fillings, whether or not they had previously been filled, were counted as "carious." Teeth indi-

Table 2. Dental caries prevalence in permanent teeth of children, first and second treatment series, Woonsocket, R. I.

[Number of teeth per child]

Age last birthday	Car-ious ¹	Filled	Car-ious and/or filled ²	Missing			DMF
				Total	Ex-tract-ed	Ex-trac-tions indicated	
	1st treatment series						
5-16 ³	6. 39	1. 32	7. 09	0. 99	0. 66	0. 33	7. 76
5-----	. 41	. 00	. 41	. 00	. 00	. 00	. 41
6-----	1. 51	. 03	1. 53	. 01	. 00	. 01	1. 53
7-----	2. 79	. 14	2. 85	. 04	. 02	. 02	2. 87
8-----	3. 62	. 33	3. 77	. 21	. 08	. 13	3. 85
9-----	4. 25	. 50	4. 43	. 29	. 14	. 15	4. 57
10-----	5. 30	. 83	5. 59	. 61	. 33	. 28	5. 92
11-----	6. 57	. 98	7. 03	. 89	. 54	. 35	7. 57
12-----	8. 85	1. 31	9. 56	1. 38	. 80	. 58	10. 36
13-----	9. 90	2. 21	11. 03	1. 54	. 98	. 56	12. 01
14-----	10. 70	2. 91	12. 56	2. 21	1. 54	. 67	14. 10
15-----	11. 88	2. 33	13. 16	2. 67	1. 83	. 84	14. 99
16-----	10. 90	4. 24	13. 21	2. 00	1. 69	. 31	14. 90
	2d treatment series						
5-16 ³	5. 30	3. 87	7. 84	0. 77	0. 66	0. 11	8. 50
5-----	. 48	. 00	. 48	. 00	. 00	. 00	. 48
6-----	1. 82	. 04	1. 83	. 01	. 01	. 00	1. 83
7-----	3. 24	. 26	3. 33	. 07	. 01	. 06	3. 34
8-----	3. 56	1. 17	4. 15	. 12	. 03	. 09	4. 18
9-----	3. 96	2. 17	5. 08	. 16	. 08	. 08	5. 16
10-----	4. 90	3. 06	6. 64	. 33	. 22	. 11	6. 85
11-----	6. 14	3. 56	8. 29	. 46	. 34	. 12	8. 65
12-----	7. 68	4. 50	10. 53	. 81	. 64	. 18	11. 16
13-----	8. 72	5. 85	12. 52	1. 15	. 96	. 19	13. 47
14-----	8. 52	7. 24	13. 49	1. 38	1. 20	. 18	14. 67
15-----	8. 31	8. 62	14. 12	2. 05	1. 88	. 17	16. 00
16-----	6. 23	9. 92	13. 65	2. 70	2. 58	. 12	16. 23

¹ Includes teeth carious only, those both carious and filled, and those indicated for extraction. ² Based on actual number of teeth carious, filled, or carious and filled. Teeth that are both carious and filled are counted only once. ³ Average of the rates for ages 5-16.

cated for extraction were also counted as "carious." (Data shown in the charts, figures 1 and 2, are cumulative and, therefore, do not

necessarily correspond with figures given in table 2. "Decayed," on the charts, shows the number of teeth that were decayed only and does not include teeth decayed and filled or teeth indicated for extraction.) Approximately 84 percent of the children in the first treatment series had one or more carious permanent teeth; in the second series about 87 percent were so

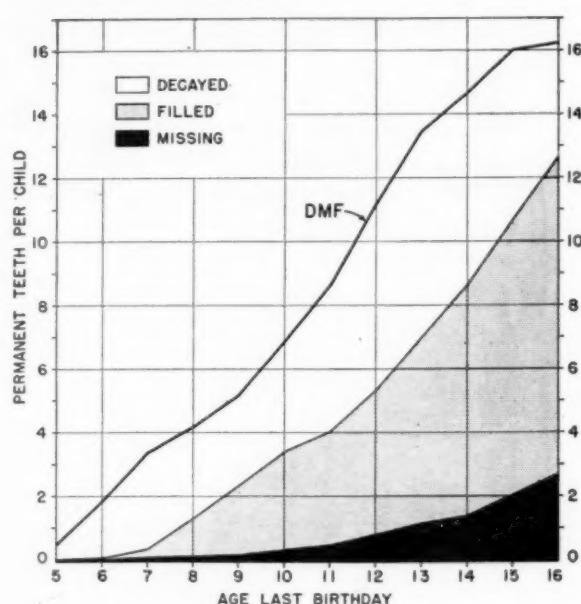
Table 3. Dental caries prevalence in primary teeth of children, first and second treatment series, Woonsocket, R. I.

[Number of teeth per child]

Age last birthday	Carious ¹	Filled	Carious and/or filled ²	Extractions indicated
1st treatment series				
5-16 ³	2.86	0.10	2.91	0.40
5	6.21	.16	6.28	.36
6	6.69	.19	6.79	.50
7	6.30	.23	6.43	.86
8	5.66	.29	5.83	1.07
9	4.36	.16	4.46	.87
10	2.67	.07	2.70	.49
11	1.38	.03	1.39	.30
12	.67	.02	.69	.20
13	.27	.01	.27	.10
14	.05	.00	.05	.01
15	.05	.00	.05	.02
16	.00	.00	.00	.00
2d treatment series				
5-16 ³	2.69	0.17	2.78	0.52
5	5.81	.24	5.93	.56
6	6.32	.27	6.45	.93
7	6.16	.40	6.36	1.40
8	5.42	.43	5.65	1.28
9	4.24	.40	4.47	.96
10	2.42	.16	2.51	.61
11	1.16	.07	1.20	.31
12	.49	.01	.50	.10
13	.16	.01	.17	.07
14	.08	.00	.08	.03
15	.01	.00	.01	.00
16	.00	.00	.00	.00

¹ Includes teeth carious only, those both carious and filled, and those indicated for extraction. ² Based on actual number of teeth carious, filled, or carious and filled. Teeth that are both carious and filled are counted only once. ³ Average of the rates for ages 5-16.

Figure 2. Dental caries prevalence in permanent teeth, second treatment series, Woonsocket, R. I., ages 5-16.



affected. In the two rounds, there were totals of 32,359 and 25,544 carious teeth involving about 58,318 and 41,376 surfaces, respectively.

As shown in table 2 and figures 1 and 2 the age specific DMF (decayed, missing, and filled) rates for permanent teeth increased in the first series from 0.41 at age 5 to 14.99 at age 15; in the second, from 0.48 to 16. At the start of the first series the average 15-year-old had 11.88 carious teeth, 2.67 missing teeth, and 2.33 filled teeth. The examination for the second series showed a decrease in carious teeth (8.31) and missing teeth (2.05) and a significant increase in filled teeth, from 2.33 to 8.62, for the average 15-year-old.

Twenty-two percent of the children in the first treatment series had one or more extracted permanent teeth; the corresponding figure for the second series examination was 18 percent.

Only 20 percent of the children had one or more filled permanent teeth on examination in the first round, but the percentage increased to 58 in the second series.

Of the primary teeth examined, 47 percent were found carious in the first series. The average 7-year-old had 12.7 primary teeth, of which 6.30, or nearly 50 percent, were decayed

(table 3). Only 4 percent of the group had one or more primary teeth which had been filled prior to the first treatment series. Examination prior to the second treatment series demonstrated only minor improvement in care of the primary dentition. The number of primary teeth filled increased from 709 in the initial round to 1,107 in the second.

During the initial treatment series the main concern was care of the accumulated defects of the permanent teeth; primary teeth received only emergency or very selective treatment. In spite of the high caries attack rate and the time required to complete the first treatment series (30 months), this policy was modified to a considerable extent in the second round. As shown in table 4, the number of primary teeth filled per child during the second round was more than 10 times as large as the number during the first.

Of the children requesting clinic care, 88 percent in the first series and 98.6 percent in the second received complete treatment; 78 percent and 87 percent of the children treated received fillings in one or more permanent teeth. More than 17 percent had at least one or more permanent teeth extracted during the first series, but only 9 percent of the children required extractions the second time around. The 684 permanent teeth which were extracted in the second series indicate considerable improvement over the 1,778 extracted during the initial treatment series.

The total number of permanent teeth filled in the first and second series was 25,939, and 24,682, respectively, averaging 4.60 and 5.08 teeth per child for all age groups. The average 15-year-old had 9.60 surfaces on 5.72 teeth restored during the initial treatment and 7.77 teeth involving 12.67 surfaces received fillings in the second series (table 4).

Selective treatment of primary teeth resulted in a total of 530 primary teeth filled in the first series and 4,140 in the second. Extractions of primary teeth numbered 5,131 and 4,391.

Additional treatment included 900 pulp cap-pings and 29 vital partial pulpectomies on permanent and primary teeth during the first period. These treatments numbered 1,163 and 214, respectively, during the second series.

Table 4. Dental treatment to permanent and primary teeth of children, first and second treatment series, Woonsocket, R. I.

[Number per child]

Age last birthday	Number of permanent teeth			Primary teeth		
	Teeth filled	Filled surfaces	Teeth extracted	Teeth filled	Filled surfaces	Teeth extracted
1st treatment series						
5-16 ¹	4.60	7.79	0.32	0.07	0.12	0.58
5-----	.37	.57	.00	.25	.43	.37
6-----	1.47	2.40	.02	.20	.37	.64
7-----	2.70	4.56	.04	.21	.35	1.03
8-----	3.32	6.16	.16	.10	.16	1.35
9-----	3.97	7.29	.19	.07	.11	1.26
10-----	4.78	8.57	.36	.04	.05	.86
11-----	6.03	10.25	.43	.00	.00	.63
12-----	7.68	12.31	.67	.01	.02	.43
13-----	7.63	12.50	.62	.01	.01	.22
14-----	6.49	10.55	.54	.00	.00	.08
15-----	5.72	9.60	.63	.00	.01	.05
16-----	5.07	8.76	.21	.00	.00	.00
2d treatment series						
5-16 ¹	5.08	8.35	0.15	0.86	1.75	0.66
5-----	.50	.77	.00	3.29	6.62	.64
6-----	1.82	3.21	.00	3.02	6.18	1.07
7-----	3.15	6.04	.06	2.42	4.91	1.60
8-----	3.45	6.57	.12	1.25	2.49	1.54
9-----	3.83	6.91	.10	.33	.66	1.24
10-----	4.70	7.58	.13	.04	.09	.78
11-----	5.93	9.18	.17	.00	.01	.47
12-----	7.48	11.26	.21	.00	.01	.27
13-----	8.40	12.87	.28	.01	.03	.16
14-----	8.18	12.67	.24	.00	.00	.07
15-----	7.77	12.67	.28	.00	.00	.03
16-----	5.69	10.46	.23	.00	.00	.00

¹ Average of the rates for ages 5-16.

Every child received at least 1 dental prophylaxis during each round. In the second period an attempt was made to provide every child with a series of 4 topical fluoride applications; a total of 5,016 children received this treatment.

Dentist Man-Hours

During the first treatment series a ratio of 1 dentist to 384 children treated per year resulted from an average of 6.2 dentists on duty in the program. During the second series an average of 5.5 dentists operating produced a ratio of 1 dentist to 470 children treated per year. This staffing average is based on a full 65-hour, biweekly period for all dentists assigned during both series with no deductions made for administrative work, vacations, illness, training, or other nonclinical activities.

Dentist man-hour rates were determined from the total clinic time actually worked by all dentists during the 30 months required for the first treatment series and the 24 months for the second. During the first round 3.3 dentist man-hours were required to complete the treatment of each child, but in the second round only 2.8 dentist man-hours, or 86 percent as much time as in the first, were needed for this work. The average number of permanent teeth treated per dentist man-hour was about the same in both series: 2.1 in the first and 1.9 in the second. However, the 0.7 primary teeth treated per dentist man-hour in the second series was an increase of 140 percent over the number treated per dentist man-hour in the first period.

The reduction in the second treatment series of 0.5 dentist man-hour required to complete the treatment of each child resulted primarily from the lower prevalence of carious teeth and to improved operating and clinical procedures. This reduction would undoubtedly have been greater had there not been constant addition of new patients with practically no previous dental treatment and had the time (2½ years) between the two treatment series been less.

Summary

Dental examination and complete dental treatment were given 5,944 children in kindergarten through the ninth grade in the first treatment series and 5,189 children in the second

treatment series of the Woonsocket, R. I., dental care study.

The first treatment series, covering a total of 30 months, was designed to care for the accumulated dental needs of the group, with primary emphasis on care of defects in permanent teeth.

The second treatment series, requiring 24 months, was designed to treat the increment of defects occurring between treatment periods and to provide substantially more care for the primary dentition. The proportion of children requiring fillings during the second round was no less than in the initial series. In addition to the increment of defects occurring subsequent to treatment in the first series, about 2,500 children received initial care in the second series.

Only 20 percent of the children had any permanent teeth filled prior to the first series; this figure increased to 58 percent at the start of the second.

Examinations for the second treatment period demonstrated that the average 15-year-old had 8.62 filled teeth, compared to only 2.33 at the start of the first series.

In all age groups, 1,778 permanent teeth were extracted in the first series and only 684 in the second.

There was a reduction of 14 percent in the number of dentist man-hours required to complete the treatment of each child: 3.3 dentist man-hours were required in the first series and 2.8 in the second series.

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RECORD and REPORT SYSTEMS in local health departments

with contributions from
Chapel Hill, N. C.,
Charleston, W. Va.,
and Portland, Maine

Among the building stones essential to the creation of an effective structure for public health services are records and reports. Recent broadening of local health department responsibilities and changing public health practices have underscored the importance of rational records and reports systems and procedures in developing, focusing, and administering services, as well as in analyzing and measuring the effectiveness of those services.

Changes in function of local health departments are reflected in the responsibilities of the professional staff. Emphasis on the individual and the family, concentration on control programs for long-term diseases, and specialization in professional fields have intensified the demand for records and reports that will aid the health department staff in giving and evaluating the services for which the department is responsible. Records and reports must therefore be designed to permit qualitative and quantitative analysis of the health services to individuals, families, and the community and to facilitate periodic appraisal of each of the health department's programs.

Considerations such as these underlie the three discussions of local health department records and reports which comprise this symposium. Quite different points of view are expressed by the authors but they and the recently published Public Health Monograph No. 15 (see *Public Health Reports* for November, pp. 1078-82) may stimulate further suggestions of ways and means by which health department records can be more effectively utilized.

Simplifying Local Service Records

By ALPHA K. KENNY

PROBLEMS associated with records are causing many health departments serious concern. The situation is becoming more acute with the continuing shortage of qualified personnel.

Like many other health departments in North Carolina and other States, the Orange-Person-Chatham-Lee District Health Department, with headquarters at Chapel Hill, N. C., had by 1950 outgrown its record system, which was installed in 1936. In those 14 years, public health had made significant progress by way of expansion into additional areas of health needs and in the quality of health services. Local health programs had changed in direction and in scope to meet changing demands. Special records had been added for some of the new programs, and procedures had been improvised for others in an attempt to record data required for case management and reporting.

A health department record system, if it is to be effective, should reflect accurately and adequately the problems in and services to the community. It should also facilitate and simplify the work of the health department. The opposite seemed to be true at Chapel Hill,

where progress was impeded at times by lack of accessible information, where recording delayed rather than facilitated the work, and where duplication of entries and numerous separate files of different records complicated operations.

Recognition of Need

In 1950, a nurse doing graduate work at the University of North Carolina School of Public Health undertook as part of her study program an investigation of the clinical and nursing service records then in use in the district headquarters at Chapel Hill. Members of the health department staff collected copies of forms and explained to the student when, where, how, and by whom each one was used. That procedure revealed the inadequacies of the record system and emphasized the urgent need to adjust the lag between the system and the current stage of program development.

However, this experience was not the beginning of the realization that these records were outmoded. For some time, the district health department had served as a field-experience center for the School of Public Health and the North Carolina State Board of Health. The district health officer and the nursing supervisor had been concerned about the unsuitability of the records for both teaching purposes and program operation.

A department of field training had been established in 1948 at the School of Public Health for the purpose of stimulating and assisting the development and use of inservice

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training. Early in 1950, an educational director with wide experience in public health records and statistics was employed to develop the records phase of the department's program.

Launching the Project

The development of a new record system requires time for study, opportunity for discussion of needs, technical guidance, and readiness on the part of the staff to accept change and to endure the burden of extra work during the transition from one system to another.

With the several situations mentioned above as stimuli for action, serious consideration of a plan to meet the needs of both the health department and the department of field training got under way in July 1950 at a regular staff conference of the district office. The educational director from the School of Public Health participated in the conference. Discussion centered around principles of records and methods simplification, trends in narrative recording, and the need for teamwork in introducing a new record system. Thereupon, the district health officer requested from the North Carolina State Board of Health approval to proceed with the project. Two records consultants on the State staff were assigned to participate in the project.

The full medical, nursing, and clerical staffs of the district office, the State records consultants, and the educational director from the School of Public Health were present at the next conference, also held in July 1950. The sanitation staff did not participate in the project. The conferees agreed that future meetings would be scheduled as frequently as necessary and that the work should proceed as rapidly as possible so that it would not interfere with current program activities. The group set up the following objectives and specific needs for the project.

Primary Objectives: A simplified recordkeeping system, adequate for case management, reporting, and program planning.

A system suited to the current level of program development.

A unified picture of all services provided for an individual and a family unit.

Secondary Objectives: Preservation of the records in files readily accessible during the period of their usefulness.

Provision of basic statistical data for evaluation and administration.

Design of records which would serve as effective tools for teaching content and management of records.

Specific Needs: Eliminate, insofar as possible, the duplication of entries.

Reduce the number of forms by combining as many as possible.

Standardize the size of forms.

Encourage meaningful narrative recording.

Facilitate keeping the data up to date.

Design a family folder to hold all correspondence and records pertaining to members of a family.

Facilitate the filing of records.

Economize on filing space.

Establish central control of service records.

Economize on time spent on record-keeping.

The enthusiasm revealed by the group as they grasped the objectives and the ease with which close teamwork developed was interesting. The specialized knowledges and skills of the individual members were so blended that it was difficult later to determine with which one specific ideas originated. Each contributed and each learned from the others. As many as three conferences were held in a week, and some members of the team worked full time—even overtime—on the project between conferences.

Early in the undertaking it was decided to abandon the idea of revising the old forms and instead to develop new forms on the basis of current programs of service, considering both the reporting requirements of the State and and Federal agencies and the more detailed administrative needs of the local department. The ever-present reminder of the difficulties experienced with the old system and the realization that public health is not static resulted in ample allowance for future expansion.

Rough sketches of proposed forms were drawn and presented by various participants from time to time. Some were accepted in part or in whole; others were rejected. The rejected sketches were redesigned and presented again. By this process there emerged for experimental use a master card, a family folder (containing a family data sheet and a family service narrative form), and an individual observation record.

These forms comprise the basic simplified service records. They provide for a summary of all clinical and nursing services to an individual, a record of pertinent information on the family as a unit, a narrative record of each service to an individual member or to the family as a group, and a record of all clinical services to an individual.

Master Card

The master card, an 8- by 5-inch form designed for use on both sides, summarizes all services provided for an individual. Each person registered with the department has such a card. Sometimes it is the only record for the individual. It combines information formerly recorded on six separate forms, namely, birth summary, immunizations, index, laboratory diagnostic services, X-ray reports, and death summary. It also provides for recording single visits or limited services to avoid opening and closing another record.

The first section of the card has space for identifying information, including name, race, sex, date of birth, registration number, name of father or husband, name of mother or wife, and mailing address.

The second section replaces and is identical to the former immunization card, with the addition of write-in spaces for immunizations which may be introduced in the future. It includes lines for recording by date immunizations for whooping cough, diphtheria, tetanus, smallpox, and typhoid.

The third section, a summary of basic records, compares with the old index card. It has columns for the date of first admission to a service, the type of service, the name of the basic form on which the service is recorded in detail (family service narrative, individual ob-

servation record, tuberculosis program register, or orthopedic clinic record), the file in which the form may be found, and the date the service is terminated.

On the reverse side of the card, miscellaneous services not recorded elsewhere are listed. To the left are 3 columns, 1 each for date, type, and result of a test or service; the remainder of the space—over half the width of the card—is for remarks. Here may be summarized data on negative laboratory reports, negative X-ray reports, the issuance of health cards, and other limited services, and data on deaths.

The Family Folder

The family folder is a lettersize manila folder of special cut labeled to show the name of the head of the family. This size folder makes it possible to insert all records without folding and to include patient and family correspondence as well as service records.

Family Data Sheet

The family data sheet was designed as a separate record to permit the replacement of worn or soiled folders without the necessity of copying the information and to encourage the typing of the record, particularly the identifying information and family roster.

This sheet provides a summary of pertinent data on the family as a unit. Following a section for identifying information at the top of the sheet is a section for a complete roster of family members. After each name in this list is space for sex, date of birth, and changes in status, such as marriage, entrance into the armed services, or departure from the home for other reasons, by date.

A section on both sides of the form equivalent to a full page is provided for the narrative recording of significant economic and social data. In this section extra-family members living in the home are accounted for in terms of their influence upon the family life. If one of these members receives service, a folder is opened for him. The objective of this arrangement is to encourage the study of families as units.

At the bottom of the form on the reverse side is a section for the chronological summarization of the various services provided for individual members of the family.

Family Service Narrative

The family service narrative form is an 8½- by 11-inch sheet ruled on both sides. At the top is a space for family identification. In a column at the left are entered the date, place of visit, type of service, and individual served. Routines normally associated with the specific type of visit are recorded in a predetermined order set forth in the records guide prepared as a part of the project. This makes it possible to find these data without reading the complete narrative statement. Each narrative entry is signed by the person performing the service recorded. All visits to individual members of the family and to the family as a unit are recorded in chronological order on the same form. This system is an improvement over the old one, which provided separate forms of different types and often of different colors for each type of service.

Individual Observation Record

The individual observation record, an 8½- by 11-inch card, is used to record in chronological order data on all types of clinical services given an individual. It replaces the numerous forms previously used for the various clinical services. It contains sections for identifying information; medical history; disease experience; immunization data (for use in well-child conferences); findings, recommendations, and progress notes, by date and type of service; and results of laboratory and other tests, by date and type. Each entry in the narrative portion of this form—the section for findings, recommendations, and progress notes—is signed by the person performing the service.

Other Records

The tuberculosis program register and the orthopedic clinic record used in the earlier system were retained without change in the new system. The former, a visible file, is a modern and useful device for operating a tuberculosis program and is a permanent part of the new record system. The latter must be used until all counties served by the orthopedic clinic adopt the simplified forms.

Supplementary records giving detailed data

are used when needed, particularly in the initiation of special programs. For example, in the nutrition program it is necessary to keep daily records of individual food consumption to determine nutritional patterns. These data are summarized on the family service narrative or on the individual observation record. Other forms, such as the laboratory form which accompanies a blood specimen to the laboratory and on which the laboratory findings are recorded, are destroyed after the results have been posted on the basic record cards, proofread for accuracy, and tabulated for reports.

The Filing System

A simplified system for filing the new service records was also developed. The master cards, which constitute the greatest volume and which are the records most frequently referred to, are filed alphabetically. Guide cards subdivide each group of approximately 25 cards. The cabinet is located beside the receptionist's desk, where the patients are registered, and is accessible to all staff members.

Active family folders containing individual observation records of family members are filed alphabetically in lettersize cabinets behind one-fifth cut guide cards. Alphabet guides are in the first position; guides with family names which occur most frequently or which are withdrawn and refilled most frequently, in the second; the family folder, labels, in the third and fourth; and "out" cards in the fifth. Immediately following the family folders are miscellaneous folders (for each alphabet letter) containing the individual observation records and correspondence for patients for whom there are no family folders.

Inactive records are transferred to an inactive file set up like the active file. Pending files are used from time to time for groups of records withheld for completion of immunizations or for those used routinely in outlying clinics.

The System in Operation

In addition to the development of new forms and a new filing system, the records project included the study of such factors as the floor plan of the building, the position of furniture

Compact, Organized Central Records Room Facilitates Management

Located on the first floor of the health department, the records room, shown in the photograph, contains: (1) master card file; (2) visible file holding tuberculosis case register; (3) intercommunication system box; (4) dumb-



waiter for sending records to the second-floor nurses' office; (5) file for family folders and individual observation records; (6) file for discontinued records; (7) metal case for carrying records to outlying clinics; and (8) file for small and large X-rays. The sketch above shows a nurse in the second-floor office adjacent to the clinic receiving a record sent up in the dumbwaiter from the records room.

and equipment, and the location of lighting fixtures in relation to the flow of records and the routing of patients. As a result of a better understanding of these factors, the staff nurses voluntarily agreed to exchange offices with the receptionist in the interest of greater efficiency. To facilitate the flow of records, a dumbwaiter, designed by the health officer, was installed to carry records from the first-floor file room to the second-floor clinic.

The forms were used on a trial basis for 8 months. A preliminary guide to their use was prepared. During the trial period, staff members kept notes on problems encountered and offered suggestions for using the records more effectively. Periodic conferences were held to evaluate progress and to consider necessary adjustments.

Only a few minor changes were made in the forms, but a number of changes were made in procedure. The transfer of information from old to new forms produced the most difficulty

and placed the heaviest burden on the staff. In May 1951, a manual of instructions incorporating the results of the preceding 8 months' experience was completed. This manual was prepared by the University department of field training.

The successful changeover from the old record system to the new was made possible through the combined efforts of public health workers from the district health department, the School of Public Health, and the State board of health, representing several different public health disciplines.

The results of this project have reached a great many people by various avenues. Students assigned to the health department for field training or for the residency program for medical officers have had an opportunity to see the system in operation. Seminars on records have been conducted for the students of the North Carolina School of Public Health as part of their study programs. The system has been

explained to visitors to the district health department. The district health officer reported on the simplified records at a meeting of the local health officers of the State. Similarly, the nursing supervisor discussed the records with the nursing supervisors of the State at an annual meeting. At the 1952 annual meeting of the Southern Branch of the American Public Health Association during the "curbstone consultation" session, the new system was ex-

plained by the nursing supervisor and by a records consultant from the State board of health. In 1953, experience with the new system was reviewed during a panel discussion on service statistics before the statistical and clerical section of the Southern Branch of the American Public Health Association. Copies of the manual of instructions with copies of the forms have been sent to public health workers in a number of other States and countries.

**P
H
R** *symposium*

Kanawha County, West Virginia

Coordinating Medical and Nursing Records

By L. A. DICKERSON, M.D.

THE NEED FOR a revision in the system of records and reports in use in the Kanawha-Charleston (W. Va.) Health Department was brought forcibly to our attention not long after consolidation of city and county units late in 1947. A short time after this merger, the local Visiting Nursing Association moved to affiliate with the official agency and to coordinate its nursing program with the official nursing program. Thus, the personnel, equipment, and records of three agencies were brought together in one location.

Within little more than a year after consolidation of these health units, the number of clinic services had more than doubled, with a corresponding increase in the case load. Spe-

cialized record forms were used for each of the clinic services, and the files were located in four different offices. Since no central index had been maintained, it was often necessary to search the files in each office in order to obtain complete information on patients receiving more than one service.

As a starting point in planning for a revision of the system, a record committee was selected from members of the health department. Included on the committee were the supervisor of nursing, the sanitation director, one clinic nurse, a records clerk, the administrative assistant, and the secretary to the public health director. Consultant help was sought and obtained from the State health department and from the regional office of the Public Health Service. Many meetings were held over a period of several months to decide upon the projected new record forms and procedures. Since provision for a health center was being made in a general hospital then under construction in another part of the city and only the clinic services were to be moved to this location upon its completion, it was decided that no attempt should be made to combine medical and nursing records, but instead to provide for interchange of infor-

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mation between the two services. Sanitation records were already centrally located within the sanitation division and were considered to be satisfactorily maintained.

The objectives set forth by the record committee in its approach to the problem were:

1. To centralize in one record all medical information on each patient and to provide for interchange of information between medical and nursing services.

2. To eliminate duplication and unnecessary recordkeeping.

3. To reduce the number of record forms.

4. To establish a routine for followup of service where indicated.

5. To compile reports only on information that would be of use.

Many considerations of a practical nature entered into the thinking of the committee in striving for the attainment of these objectives. A majority of the clinic service records then in use were 5 inches by 8 inches in size but of different designs. A major complaint of personnel using these records had been that the same basic information on a given patient was recorded on several different forms. To meet this objection it was decided that a single form should be devised for recording all medical, social, and economic information needed on the patient, whatever the clinic service.

Clinic physicians had expressed a desire for a form with only a few general headings but with sufficient space for entering rather complete notes covering history, physical findings, and recommendations. Accordingly, a simplified history and physical examination form was prepared.

Three other forms that were considered essential were developed and adopted without disagreement. These provided for recording (1) all public health laboratory tests on a single form, (2) continuing observations and services, and (3) the public health nurse's report to the clinic. Provision was also made on the latter form for supplying information to the public health nurse as to physical findings and recommendations of the clinic physician.

Since an appreciable number of persons visiting the clinics received only screening tests, the need was felt for a form less expensive than

a folder to record miscellaneous services other than services rendered by a physician. This consideration led to the adoption of a form which could serve as an index card and could also be used to record such miscellaneous services as laboratory tests, immunizations, and chest X-rays.

In order to utilize filing equipment then on hand and to make it possible to interfile old service records with the index cards, it was decided that this form should be 5 inches by 8 inches in size.

Forms and Rules for Use

The record forms that were finally adopted and the general rules for their use are as follows:

Index card. This card is completed for each person visiting the health center for service. A number is assigned to each individual at the time of the first visit, to be retained for all subsequent visits. For all patients not examined by a physician in one of the clinics, this will be the only service record.

Record folder. A lettersize manila folder containing the necessary basic forms is prepared for each individual to be seen by a physician in one of the clinics. A distinctive color tab is affixed to the folder to denote the clinic service. The individual's number, obtained from the index card, is entered in the upper right-hand corner of the record. Each folder has a pocket inside of the back cover to hold odd-sized, old record forms.

Forms Included in Record Folder

Five basic forms are included in the record folder:

Basic data form. This form provides space for recording all necessary basic information on the patient and members of his immediate family. It is completed for each individual at the time a record folder is initiated. When more than 1 member of a family visits the health center at 1 time, detailed information concerning the family is recorded for 1 member only and a reference note made on the records of the others.

Medical sheet. Pertinent history, physical findings, and recommendations are entered on

this sheet by the examining physician for all public health clinic services except tuberculosis, for which there is a special form. A few outpatient clinics require a special form in addition to the medical sheet and the tuberculosis form.

Laboratory report form. All laboratory reports are entered on this form except when laboratory tests are performed in the hospital laboratory. In the latter instance the original report is included in the record folder. Chest X-ray readings are sound recorded and transcribed directly to the laboratory report form.

Progress notes. This sheet is used by all workers in the health center to record their observations on or services to a patient. Social service and mental hygiene clinic workers record only a summary of their findings and recommendations on this form and keep a separate file of detailed case studies.

Nurse's report to clinic. This form is completed and sent to the health center for all individuals referred to the clinic by the public health nurse. It is also used to inform the public health nurse of the clinician's findings and recommendations for home care. When used for the latter purpose it is retained in the nursing record.

The basic data and progress notes sheets are stapled to the left inner side of the folder, with the basic data underneath. Staples are used here for economy, to reduce bulk, and also because there is usually no necessity to remove these forms from the folder.

On the right side of the folder a binder holds the remaining record forms in place in the following order from the top: medical sheet, nurse's report to clinic, correspondence, laboratory reports.

Appointment cards, tickler files for followup, and clinic route slips are also prepared. The route slip is attached to the record folder and serves to indicate the services to be received by the patient.

Changing to the New Record System

The date for changing from the old to the new system was set to be effective when clinic services were activated in the new health center.

Since the tuberculosis case load was one of

the highest, it was decided to use the active register of these patients as a basis for converting old records to the new system. About 6 weeks prior to the proposed date of the change, an additional records clerk was employed on a temporary basis. This clerk reviewed the tuberculosis records and prepared a new folder for each active case, filing the old clinic record forms in the pocket inside the back cover of the manila folder. Each patient was assigned a permanent clinic number. Other clinic files in the department were searched for each patient whose record was transferred into the new system and, when other records of service to these patients were found, the various-sized old record forms were included in the pocket of the folder. No attempt was made to transfer detailed information from the old to the new forms.

The process of combining all records on active tuberculosis cases and entering them in the new record folders before moving to the health center constituted a trial period with the new system. This enabled us to make many adjustments in record procedures which contributed materially to smoothness of operation when the system later became effective for all service records.

Clinic equipment, personnel, and records were transferred to the new location, all services were discontinued for 3 days, and all active clinic records were moved into a central records office in the public health wing of the hospital. When operation was begun in the new location, all patients coming in for clinic services had records instituted in accordance with the new system.

As had been expected, several problems were encountered during the period of transition. However, most of these problems were minor in nature and were concerned with the routing of patients and flow of work. Somewhat detailed rules for use of the new records had been developed prior to their adoption, and these had been discussed in frequent conferences with all personnel using the record forms. Although an additional experienced clerk had been appointed for a 2-month period, the burden thrown on the chief records clerk was exceptionally heavy during the trial period when active tuberculosis records were being

converted into the new system. It was gratifying, however, to note that after a short period of experience, less time was required on the part of all concerned in maintaining the system. It has not been necessary to employ additional record personnel, although the case load remains at essentially the same level as it was prior to the institution of the new system.

With the exception of 6 lettersize filing cabinets, no major new equipment items were required.

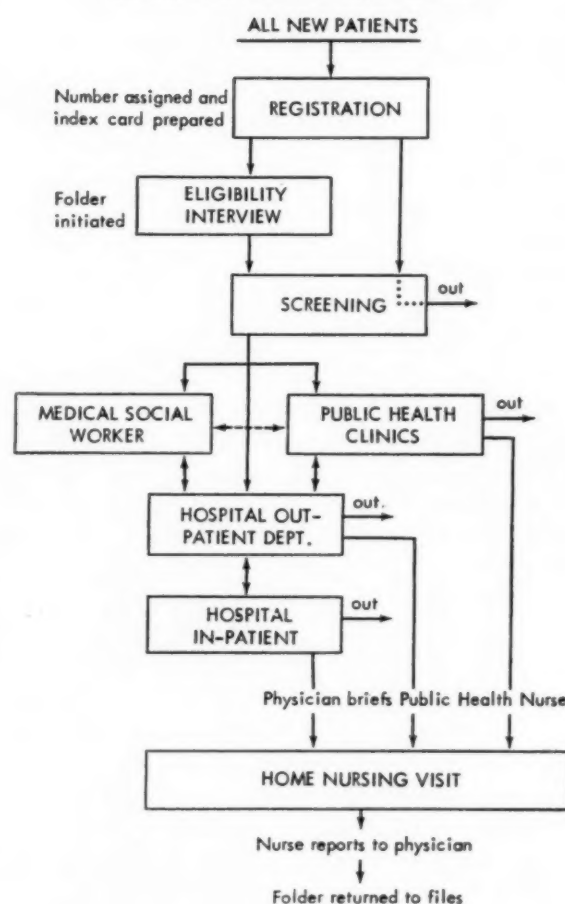
Cross-Referral of Records

Several months after the new record system was instituted, outpatient clinic services were established by the hospital in a separate wing. By agreement with hospital authorities, all new patients reporting for outpatient services are interviewed by health unit personnel and a decision made as to their eligibility for such services. Thus, the records for patients visiting the hospital outpatient department are initiated in the health center as well as those for patients visiting strictly public health clinics.

After registration, all new patients routinely have blood specimens drawn for a serologic test for syphilis and for dextrose determination and receive a chest X-ray. Those patients who are to visit an outpatient clinic are then escorted with their records to the outpatient department of the hospital. These records remain in the outpatient department, are filed there, and their location is shown on the health department index card. If a patient is referred back to one of the public health clinics, his record is requested from the outpatient department of the hospital and its whereabouts shown by an "out" card placed in the outpatient department file.

When a patient is transferred from one of the clinics into the hospital, a transfer form is executed and, in addition, the outpatient clinic record and/or public health clinic record is incorporated into the hospital record folder. Upon discharge from the hospital, patients who are referred for clinic service have their records made available to the outpatient department. When home nursing visits are requested, the nurse's report to clinic form is completed by the physician requesting the visit, and this form is retained in the individual's record of

Flow of patients and records, Kanawha-Charleston Health Department.



"Out" indicates home visit not necessary

nursing service. After making the home visit, the public health nurse uses this form to report to the clinic physician the observations made and services rendered. This report is then included in the clinic service record. The chart illustrates the flow of patients and records through the health department clinics and the hospital.

Since an index to the records of all clinic patients is kept in the public health unit, it has not been considered necessary to have a record index in the outpatient department of the hospital.

Tabulating Reports

In conjunction with the adoption of new record forms and procedures, a report form to be used as a daily work sheet was developed.

This form calls for a minimum amount of information on service provided the individual and on place of residence and is intended primarily for the information of local appropriating bodies. Certain additional information is compiled for maternal and child health and communicable disease services to be forwarded to the State health department. Reports are summarized once monthly. It is the belief of the Kanawha-Charleston Health Department that with this system professional personnel can obtain adequate additional information by an annual case-record review and by sample studies as the need arises.

Factors facilitating such reviews or studies are:

1. The distinctive color tab affixed to the folder to denote the clinic service or services which permits ready selection of records.

2. All services received by the individual complete in one folder or, if there is no folder, on one card.

3. Simplification of forms and reduction in their number, which reduces the task of extracting needed information.

Comment

Not long after the institution of this record system its advantages became apparent. Almost immediately satisfaction was evinced by all personnel concerned with medical and nursing records. In the 18 months that the new forms and procedures have been in use only minor changes have been necessary. Thus far no serious disadvantages have been found. One of the most important advantages noted is that the complete record accompanies the individual as he or she is routed for various clinic services. As a result, the work flow is smoother and the patient is served more effectively in less time than was possible with the old record forms and procedures. It is true that the index card has proved to be somewhat larger than necessary to record the required information on a substantial number of the patients reporting for service. However, this objection would seem to be outweighed by the advantage of being able to interfile index cards and old records of the same size.

**P
H
R** *symposium*

Portland, Maine

Reexamining Health Record Forms

By EDWARD W. COLBY, M.D., M.P.H.

RECORDS AND STATISTICS go hand in hand, but since records are the source of statistics, they are basic. If these basic records lack in quality, the conclusions drawn from them will be that much less valuable.

But however anxious we are to have usable records and the statistical data derived from them, to a goodly number the recording of information is a chore to be avoided. Why? Lack of time? Yes, to some extent. Lack of interest? Undoubtedly. Too much detail may require too much effort or the recordkeeper

may discern no useful purpose for the information. Recording of information and data, unless carefully tended, may easily become merely a matter of habit. Like garbage, record procedures and forms must be reviewed and removed often to keep them from becoming obnoxious.

Change in Emphasis

It is generally agreed that records should be maintained for the purposes of: (a) providing the best possible service to individuals and fam-

ilies; (b) program planning; (c) more efficient program operation; and (d) program evaluation. In too many instances, however, records are maintained for justification—the accounting for time or the accumulation of impressive figures. The perpetuation of this fault cannot be blamed solely upon those in the profession. It must be shared by those to whom we may be responsible—the public at large, mayors, managers, councils, and boards.

To change this superficial approach to record-keeping, the health department must, perhaps, present public health to these groups in more solid and understandable terms, concentrating upon the substance from which these data are derived.

Many lengthy discussions have taken place as to how to record and account for certain activities. Consider nursing visits, for example. To the individual, family, and community served by the visit, the activity may be of major importance, as in the instance of an initial followup visit to a tuberculosis suspect. Yet when that particular visit is cumulated as a part of total “nursing visits” in an annual report, it becomes just another numeral and has no particular significance to the community.

How much would be lost if we discontinued accounting for such items as number of nursing home visits and substituted the number of nursing hours devoted to home visits, to school or clinic service, or to other special activities? This information, when related to the numbers of individuals served, would be of much greater significance to everyone. True, a long chain of precedence would be broken, for never again would that particular service be able to make a comparison with another agency on an annual basis of numbers of nursing visits alone. (If for some particular reason the number of visits

were necessary, sampling would provide these data.) Are nurses employed for the number of visits they are to make or are they employed to give a certain number of hours of service per week? The answer is obviously the latter, and it is the only basis, particularly in a generalized service, upon which performance accounting is at all valid.

Standardization

Despite many statements to the effect that “standardization of forms and records is not possible because of the variation in program emphasis from one community to another,” it is my personal contention that appreciable standardization is possible. The principles of public health are basically the same the country over, and in spite of varied emphasis standardized record forms could be used to considerable advantage. Perhaps the difficulty involves not only standardization of record forms but also the companion need of uniform nomenclature. More uniformity is possible. Witness the increasing acceptance of the Public Health Service recommended eating establishment and milk ordinances and codes, the national plumbing codes, and many of the service records relating to these. To some extent standardization has been accomplished in certain nursing records. The Public Health Service has promoted a certain degree of uniformity in tuberculosis and venereal disease service records, but much more can be accomplished in this respect.

Nearly 20 years ago the American Public Health Association's Committee on Administrative Practice named a Subcommittee on Record Forms whose “purpose was to encourage the development of a satisfactory system of records for city health work.” The workable forms drafted by the committee were edited by Walker and Randolph and published under the title of “Recording of Local Health Work.” That volume outlined basic principles concerning forms and records applicable to the programs of that day, and it has remained about the most complete reference on the subject.

A valuable aid to many local health departments, small or large, would be a central reference source from which could be obtained sample records manuals with forms and informa-

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tion regarding types of records systems. Many commercial distributors of business forms and methods seem to be of little assistance in adapting their systems to the needs of public health, although it would seem a simple matter to devise stock forms for public health similar to those available for private physician, dentist, and hospital records.

Records in Portland

The Portland health department's concern with a review of its records and records procedures began approximately 3 years ago, with a reorganization of the department. Most of the record forms of the department had been in use for an extended time. In many of them, items were being recorded as a matter of course without any particular knowledge of how the information could be used. Reasons for this were evident. The staff had not been indoctrinated in the use of the particular forms; it did not have the benefit of periodic review of forms, and no forms-use manuals existed.

For the two reasons, economy of staff time (work simplification) and to obtain more meaningful statistics for program planning and community education, a records review was undertaken. Because of the magnitude of the problem, it was decided to concentrate upon nursing and medical service records as the first step. A short-term loan of a Public Health Service records consultant was obtained to advise and assist. Following the basic step of a general study of the record forms procedures and files, a staff committee was appointed, and all proposals were discussed with the committee at frequent intervals. This procedure served not only to reconcile differences of opinion, but also served as inservice training.

Procedural Revisions

A summarization of accomplishments illustrates the value of such a study. Much time and effort have been saved by procedural revisions: transfer of certain phases of the recordkeeping process from nurse to clerk; rerouting the flow of records; redesign of work sheets and cumulative reports; and joint participation of clerk and nurses in certain preclinic records preparation. As an example, it was estimated that

formerly at least 8 percent of the total staff nursing time, the equivalent of one nurse's time, was used in the keeping of other than service records. The time now required has been reduced to but a small portion of the previous figure. The elimination of miscellaneous registers containing information on record elsewhere was in itself a timesaver.

As planned, this study is only one step toward an eventual complete overhaul of records which will result in even greater economies of time and the accumulation of more valuable statistics. Long-range planning anticipates the use of mechanical tabulating procedures such as "mark-sense" records. These will enable the health department to accumulate administrative and service statistics with a minimum of extra effort. To this end, the department's basic record review and simplification process is an essential interim step. Many of the resulting records are intentionally designed for temporary trial and error use before final adaptation to mechanical tabulation forms.

The benefit of procedural revision was clearly demonstrated after a system of hand-sort punch cards was installed for recording and analyzing vital statistics. Prior to its use approximately 2 months were required to assemble and tabulate data for the annual report. It now takes approximately 2 weeks for the same procedure.

Single Immunization Record

A single immunization record was developed which permanently records the parent's signature giving consent for both primary immunization and "booster" doses. This same record also provides for an individual's chronologic history of all immunizations. This one card replaces at least three record forms maintained for separate immunization procedures. In arranging for school immunization clinics, this record avoids the further necessity of preparing and sending home to parents separate consent slips when "booster" shots fall due.

Besides saving the costs of the several different immunization forms and consent slips and the time spent in processing all of these, this innovation also eliminated three separate immunization registers. Information recorded in these latter was actually a duplication of data already recorded on separate cards.

		P	B	B	B	P	B	
		DPT			DT		SP	
NAME		BIRTH DATE						
ADDRESS		GRADE		SCH.		RM.		
I hereby request the physicians of the PORTLAND HEALTH DEPARTMENT to give my child whose name appears above, the following IMMUNIZATIONS (including "booster" doses) combined DIPHTHERIA-WHOOPING COUGH-TETANUS.								
SIGNED								
PARENT OR GUARDIAN				ADDRESS			DATE	
Do Not Write Below								
VACCINE	DATE 1ST DOSE	DATE 2ND DOSE	DATE 3RD DOSE	DATES OF BOOSTERS				
SM. Px	DATE	RESULT		REVACCINATION DATES				
PORTLAND CITY HEALTH DEPT. SM. 9-52 D.								

New Immunization Record Card

Master-Location File

The establishment of a so-called master-location file within the sanitation unit combined records housed in many separate files. This is a general resource file for information on premises, other than those of special classification (restaurants, bakeries, and pasteurization plants). In this file, in individual 8½- by 11-inch folders arranged alphabetically by streets and street numbers, are kept all records and correspondence pertaining to a particular address, housing sanitation original inspection reports, the resultant orders issued, exchange information from fire, electrical, building, public works, and other departments. These folders contain extensive chronologic histories and, to avoid loss of papers, since they are used by several persons, a patented "corner clip" affixed to the folder binds them in place, yet makes removal and insertion a simple matter. This combination has eliminated a number of different sized card and record file cabinets and the consequent

number of places to search for information. It takes no imagination to realize the savings in time and patience resulting from the use of this centralized-file procedure.

Within the current year the city of Portland has been officially divided into census tracts for the first time. Henceforth, the health department will be able to relate sanitation and nursing services to population and environment, the more effectively to evaluate service as well as to plan future program requirements.

To those who may be concerned with the development and use of records, these simple suggestions are made:

1. Plan carefully.
2. Design simply.
3. Pretest if possible.
4. Seek assistance from practical consultants.
5. Make friends with a good printer.
6. Develop a forms-use guide.
7. Review periodically and revise when indicated.

Curbstone

Consultation:

An Effort

To Improve Communications At Annual Meetings

I. Origins of the APHA Southern Branch Experiment

By BEN FREEDMAN, M.D., M.P.H.

AS PROFESSIONAL associations have grown in size and numbers, annual meetings in particular have become more diversified and cumbersome. In the initial stages of the development of public health associations, only a small handful of enthusiasts participated. Such small and highly motivated groups had no need to be unusually concerned about methods and techniques of holding meetings.

Tradition, however, has a way of stabilizing procedures, and financial considerations are a powerful force in channeling the course of

activity. These can shackle forward movement, unless, of course, the tradition be itself in essence a conscious effort to innovate, to accept, and to adapt to change, and unless we become masters of our financial problems rather than finances becoming the master of our methods. In public health, tradition has been of a very plastic character in relation to the science of hygiene, less so in relation to the art of group dynamics. Thus, the scientific content of our annual meetings has continued to grow while the efforts to get this information to attending members have been much less fruitful.

To a large extent, this has been true because of the compulsion for getting "papers" presented and published, even though many of the papers be merely restatements of already established information and themes. This tradition has continued to grow, and the limited outlet for publication has created a bottleneck and a dilemma. And yet, there is as important a place for the presentation of elementary information as for the new without perpetuating the pressure of publishing such presentations. This is especially true for new public health workers and for the partly experienced and un-ripened field workers who are in the process of learning that which the experienced health worker has already crystallized into his store of knowledge. It is the kind of information which is best disseminated through consultation and discussion.

Dr. Freedman is director of the public health training center of the Louisiana State Department of Health and assistant professor of public health administration, department of tropical medicine and public health, Tulane University Medical School. He has taken a leading part in the activities of the Southern Branch of the American Public Health Association since 1946, as program chairman, as secretary-treasurer, as president (1950-51), and as a member of the executive committee in 1952-53.

It is our task to make a place in our annual meetings for restatement of the older and established information for those who need it without encumbering the already seasoned health workers who are seeking what is new. There are, of course, exceptional circumstances when exceptional individuals may present interpretations of old ideas in a new and enriching manner.

What is needed, then, is not fewer meetings but a better adjustment of the dynamics of holding meetings patterned to the purposes for which particular meetings are held.

The Needs of Field Workers

The Southern Branch of the American Public Health Association has centered its interest primarily on the public health field worker. It has, therefore, been incumbent on the Southern Branch to devise methods of holding meetings which would best serve the field workers, and which would make the annual professional meetings both opportunities for the active participation of most of those who attend and profitable public health experiences for those who participate.

The purpose of annual meetings should coincide with the interests and needs of those for whom the meetings are held. For the majority of public health field workers, the most common reasons for going to meetings could be classified as follows:

The need that professional workers have for talking over their problems and sharing their local successes with colleagues from other localities and with recognized specialists and authorities.

The mental and emotional stimulation they get in anticipating the atmosphere of good fellowship and in experiencing the unexpected—effects which are reflected in performance on the job.

The need of individuals to expand their sphere of participation in the activities and achievements of public health work, particularly to participate actively in professional meetings in order to satisfy their ego, to widen

their sphere of acquaintance, to develop a broadened viewpoint, to accumulate experiences, to learn new trends—all of which develop confidence and build competence.

The feeling that they will gain a better perspective of their specialty in relation to the total public health picture, and the need to feel part of a larger community of interests to which a portion of one's life has been dedicated.

If the majority of public health field workers go to annual meetings for at least some of the above purposes, then the planning, the organization, and the operation of the meetings will require a more dynamic approach. All, or most, of the expectations of the membership necessarily must be satisfied and members must be stimulated and helped to meet in productive manner for discussion of their problems.

The First Curbstone Attempt

No one in a professional field is unaware of the inherent vitality of the annual meeting or of its shortcomings. A large assembly is more often than not charged with the atmosphere of hide-and-seek, despite the fact that much which is there is valuable and useful. In such an atmosphere in 1950 was born the idea of "curbstone" consultation. Could not public health consultants man booths similar to the commercial displays and exhibits seen at many association meetings? Could not they exchange information there with their colleagues who seek a heart-to-heart discussion of the routine problems which the formal presentation of papers seems not to touch?

The idea caught on. Some weeks later it was adopted by the program planning committee of the Southern Branch for its 1951 meeting in Biloxi, Miss.

The informal designation of curbstone consultation was used to describe this approach, with the hope that the informality of the method would secure flexibility and adaptability. Since a start had to be made, the Biloxi meeting was geared to the following plan:

A list of 50 public health subjects thought to be of interest to field workers to be selected and classified in accordance with the major interests of the various sections of the parent American Public Health Association.

In the same manner as scientific and commercial exhibits operate, each subject or group of subjects to have a booth; those representing subjects relating to a particular section to be arranged in proximity.

Each section chairman to be responsible for obtaining enough consultants to operate each booth. Depending on the nature of the subject matter, there should be enough consultants for each booth so as not to tie down any consultant over too long a period, since each one would probably also have need for seeking consultation.

Consultants for each booth to develop their own method of operation, being responsible for bringing their own visual aid materials, technical demonstrations, or printed matter.

Each booth to have at least one table and several chairs and to be supplied with a registration book.

Each section chairman to be responsible for having placards made for each of his section booths, indicating the names of the consultants serving each booth at a particular time.

An overseer or manager for each booth to be designated from among the consultants who would meet for a short time before the curbstone session in order to plan such administrative details as the sequence in which the consultants would take their place in the booths.

Out of a 2½-day meeting, a full day to be devoted to curbstone consultation.

This plan, of course, was designed to meet the general needs of field workers. Specifically, it was hoped it would—

Give broad participation to field workers.

Give firsthand personal contact between Association members from different States in an organized, orderly, and expeditious manner.

Give a real opportunity for exchange of ideas and personality impressions.

Bring the timid more easily into participation.

Provide a better opportunity for general and specialized information exchange.

Make most people feel their importance in the community of health workers.

Breed confidence in those who might feel themselves lacking in the opportunity for broadened contacts.

Bring together on a favorable basis those who have had the opportunity to contribute to public health with those who are becoming the future contributors.

Bring into more favorable light those who deserve recognition.

Stimulate those who were chosen as consultants to organize their knowledge about their subjects and to develop their abilities to impart their knowledge to others.

The Plan in Operation

The section chairmen were key figures in developing the *modus operandi* of this first attempt at curbstone consultation. They were supplied with an outline detailing their responsibilities and those of consultants and booth managers and setting forth some of the details of arrangements. Consultants were urged to get at the preparation of materials as early as possible. Special attention was given to materials to be used in the consultation process. The following were specifically suggested:

Articles, pamphlets, outline notes, worksheets, and the like, which describe new methods of approach to problems, new techniques, means of evaluating programs, and any other tools which could be of practical use to the field worker.

Placards carrying provocative questions concerning practical field problems.

Technical demonstrations that would be interesting and informative to the membership.

Audiovisual materials for demonstrating aspects of work which could be adapted by field workers.

Section chairmen were advised further that an announcement would be made at the first general session of the meeting describing the purpose of curbstone consultation and how it

would operate. Consultation periods were scheduled for an afternoon and for the following morning.

Naturally, there was some misunderstanding and apprehension on the part of those making the arrangements and of the consultants. Even the essentially mechanical matter of arranging the booths to the satisfaction of the consultants was not easy. Some booth spaces were too small and too far removed from the flow of traffic. Signs and placards were not all ready and satisfactory. Some booths were spaced too closely, and others lacked needed equipment and facilities. The commercial booths were separated from the consultant booths and were located conspicuously away from the flow of traffic. Some booths had to be dismantled too early in order to prepare for other activities. Nevertheless, the crowds that attended the booths were encouraging, and most individuals who were not concerned with the operations appeared to be having a refreshing experience.

Lessons From Biloxi

No plan for evaluating the curbside consultation part of the program had been set up. However, every section chairman and consultant was asked for observations that would contribute to better planning in the future. Many other individuals were asked for similar pertinent criticism. Much was gleaned from this unorganized method of evaluation; and, indeed, many flaws in the method of organizing the program were brought to light. However, with few exceptions the response was enthusiastic and exciting. Most individuals were convinced that this method or a similar dynamic organization, when developed more smoothly, would definitely meet the needs of the field workers.

A meeting was called several weeks after the Biloxi meeting to evaluate the criticism and to make recommendations to those who were to organize the next Southern Branch meeting in the spring of 1952 at Baltimore. Recommendations dealt both with the general approach and with details of administration. It was suggested, for example, that 2 half days be devoted to curbside consultation on the second day of

the meeting. Planning, it was thought, should be handled by a chairman and committee, and the planning phase should be extended. Also, more advance information about the plan should be made available, including names of consultants and their topics and schedules. Southern Branch members should be briefed at section meetings prior to the consultation day. If possible, section meetings should be tied in with consultation in such a way that questions remaining unanswered could be referred to the proper consultation booth. The membership also should be informed of their own responsibilities as well as of the personal advantages to them in participating in the consultation process; that is, they should be prepared to raise questions and discuss their own problems and experiences.

It seemed sensible to reduce the number of consultation booths or topics to a relatively few functional and subject-matter categories, each precisely defined. Consultants should be asked to make an effort to find out as much as possible about each other's topics so that useful referrals could be made, should spend at least 2 hours on duty, and should report to the chairman their experiences and suggestions for further development.

As for physical arrangements, temperature, ventilation, and lighting were found to be important. Booths should be easy to locate, well marked, attractively arranged to permit a degree of privacy in consultation. The booths should be set up before, not during, the meeting. They should be stationary and not subject to interference from other activities. Commercial and scientific exhibits should be placed in the same general area, or at least in the stream of traffic, and exhibit materials and means of posting signs and displays should be provided.

Although the recommendations resulting from the evaluation of the Biloxi meeting supplied a few new items which were adopted for the 1952 Baltimore meeting, the new circumstances of the latter meeting brought forth new ideas and new experiences which were quite unexpected and exciting, thus underscoring again that flexibility and adaptability are the essence of the curbside consultation technique.

II. Three Years' Experience With Curbstone Consultation

By WILLIAM P. RICHARDSON, M.D., M.P.H.

ALTHOUGH there have been many criticisms and suggestions with respect to details of plans and arrangements, there has been universal and enthusiastic approval, by all who have participated, of the "curbstone" consultation technique pioneered by the Southern Branch of the American Public Health Association since 1951. Some of its advantages are immediately apparent. These, and the history and philosophy of the idea, have been well stated by Freedman in the preceding report.

This discussion is devoted to an analysis of experience at the three meetings where curbstone consultation has been used—Biloxi, 1951; Baltimore, 1952; and Atlanta, 1953. Because the technique was new, a deliberate effort has been made to try different methods of organization, and it is believed that sufficient experience has been gained to provide some guidance to those who may wish to consider its use.

Perhaps the most difficult problem in developing a curbstone consultation program is that of physical facilities. The original concept was that spaces or booths similar to those used for commercial and scientific exhibits should be provided. While this concept has value so far as the general plan of arrangement is concerned, it was soon apparent that the spaces needed to be much larger than conventional booths. The consultation often assumed the form of a roundtable or group discussion involving 10 to 20 or more people, so the area provided had to be sufficient to seat that number.

Seriously complicating the problem of space

and arrangements is the fact that few hotels or auditoriums have sufficient available space to provide for curbstone booths in addition to the usual commercial and scientific exhibits and general and sectional meeting places. Thus, it becomes necessary to set up booths in areas used at other periods for regular meetings. The time required for conversion must be considered in planning the schedule. The provision of stands, screens, or curtains for separating the spaces may also create difficulties, and it is essential that this need be anticipated and arrangements to meet it be made well in advance.

It has been the experience of the Southern Branch that ideal or even nearly ideal arrangements cannot be expected, but with careful planning, arrangements that are reasonably satisfactory can usually be worked out. A decision that sometimes must be made is whether to use some very satisfactory individual spaces which may be available at considerable distance from the main area. In our experience it has proved better to group the booths in the same general area, even though by so doing some of them will not be quite so satisfactory in space and appointments, because isolation is a severe handicap.

The period devoted to the curbstone consultation program also provides a splendid opportunity to visit the various exhibits, and to this end it is helpful if the curbstone area is fairly close to the exhibit areas.

The most satisfactory arrangement worked out has been to set up 2 rows of booths in a large meeting hall or ballroom, separated by heavy curtains or screens, preferably 6 feet high, providing space of approximately 12 by 14 to 14 by 16 feet. If it is anticipated that most booths will not have more than 8 or 10 participants at a time, the size of the spaces may be reduced somewhat and provision made for the availability of 2 or 3 rooms capable of accommodating 25 or 30 people to which groups which outgrow the booths can be moved. It is preferable that the booths not be too small, however, because size helps to mitigate noise interference and foster the illusion of privacy. Basic equipment needed is a table, chairs for the consultants, 15 or 20 chairs for those seeking consultation, and a sign indicating the consultation

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topic. The sign is most advantageously displayed on a small stand or easel.

Patterns of Scheduling

The Southern Branch meetings are of 2½ days' duration. We have experimented with both the time relationship of the consultations to other features of the program and with the plan of scheduling subjects and consultants. At the Biloxi meeting in 1951, where the curbstone feature was first introduced, the consultation period was scheduled on the first afternoon after a morning general session, and again on the second morning, followed in the afternoon by section meetings. At the 2 subsequent annual meetings, it was scheduled from 9 a. m. to 3 p. m. on the second day. No other technical sessions were scheduled for the day, and no recreational activities were planned until after 3 o'clock. This second schedule worked somewhat better than the one at Biloxi. However, the suggestion has been made, and probably will be incorporated into the plan for another year, that it would be helpful to have a general session, perhaps 1½ hours in length, on the morning preceding the curbstone program. With the day's program consisting of only the informal consultation feature, many people tend to get scattered. Having a brief formal session of general interest first might counteract this.

Another significant factor to be considered in planning the schedule is the form the consultations are expected to take. The original concept was almost exclusively in terms of a single individual seeking advice and assistance in regard to his particular problems.

In practice, the process has more frequently turned into group discussions involving a number of individuals. These have proved to be popular and most worthwhile, but there has been the complaint that they did not allow the opportunity for desired individual consultation. This problem has not yet been solved. For the next annual meeting, it is proposed to divide the consultation time into 2 periods of perhaps 2 hours each. During the first 2 hours, there would be general consultation, usually on a group basis. During the second 2 hours, there would be individual consultation by appointment only. Appointments could be made for

15-minute periods by signing a sheet available at the booth or at the registration desk during the first 2-hour period.

Topics and Consultants

For the Biloxi meeting, a list of general topics was compiled, and each section chairman assumed responsibility for getting consultants for the group of topics which fell within the area of interest of his section. In general, one consultant was selected for each topic, and he was delegated to get other consultants. As a result, many of the more widely known workers in the region were asked to participate in consultation on as many as 6 or 8 topics, and there was much confusion. For the past 2 meetings, detailed planning has been concentrated in a small committee and has actually been handled largely by the chairman. This has thrown a heavy burden on this one individual, but it has made for much more effective coordination and balance.

Under this procedure, section chairmen made specific suggestions as to consultants and subjects, and the committee canvassed association officers and other public health leaders in the various States for additional suggestions. The committee then worked out a tentative list of subjects and consultants, and either issued invitations to the proposed consultants directly, or asked the section chairmen to assume this responsibility for specific individuals. In some instances, section chairmen have assumed responsibility for obtaining consultants on specific subjects, but the chairman of the curbstone committee has received copies of all correspondence so that conflicting invitations or misunderstandings were avoided.

Experience has led us to favor considerable flexibility as to selection of subjects. At the Biloxi meeting, topics were quite general and broad; for example, "local public health nurses," "venereal diseases," "maternal and child health." At the Baltimore meeting, much more specific topics were selected. Many of these were further broken down into three sub-topics, each of which was scheduled for a 2-hour period and was covered by a team of 2 or 3 consultants. At the 1953 meeting in Atlanta, the topics were both general and specific, and teams of 6 or 8 consultants were assigned to each booth

for the day. It was left to a designated booth chairman to work out a schedule which would keep at least 2 consultants at a time on duty without imposing too long a period of service on any individual. This latter plan seems preferable.

The number of topics is determined not only by the need for covering subjects considered to be of widespread interest but also by the space which may be available. In most places where meetings with a membership the size of the Southern Branch (under 1,000) are held, it is unlikely that available space will accommodate more than 18 or 20 booths. Such limitation on numbers requires careful selection of topics. One device which has been of value is to frame the subjects so they will be of interest to several professional categories of people, and to have each category represented on the consultant team.

With respect to selection of topics and consultants, it is advantageous to use both recognized authorities who will be consulted because of their reputation, regardless of the assigned subject, and workers who may be relatively unknown but who have developed a successful program, activity, or technique about which others would like to know. In general, it enhances interest if it is known that a consultant has been selected because of special achievement or competence in the area of the consultation topic. One important source of consultants, of course, is the participants in the general and section programs.

Another factor with which we have experimented is that of displays and exhibits. Originally, all the emphasis was on consultation, and eye-catching exhibits were not encouraged. We have come to the conclusion, however, that here again it is well to allow considerable flexibility and to leave to the judgment of the consultants whether displays or exhibits, or even slides or films, may contribute to the consultation function. A measure of variety makes the program of greater overall interest and attractiveness, provided the fundamental concept of consultation is kept in mind.

Instructing Consultants and Participants

There are several specific details of planning which are important to assure understanding

and smooth functioning. One of these is the provision of a sheet of information and instruction for prospective consultants. Many who are asked to participate will be relatively unfamiliar with this kind of program, and it is helpful for them to receive, at the time of invitation, a sheet describing the program, its purposes and general method of operation, the facilities which will be available, and exactly what is expected of consultants.

This information should be followed by a meeting, which has been scheduled in advance and included in the printed program, of the consultants and the section chairmen with the curbstone consultation committee. At this meeting, last-minute instructions can be given, final details as to plans and arrangements explained, and an opportunity to clarify specific points provided.

An important part of the success of the program depends on intelligent participation by those desiring consultation. To this end, a brief description of the plan is included in the printed program, and the curbstone chairman is given an opportunity at the first general session to explain the process and make any last-minute announcements. In addition, a 2-page mimeographed folder has been distributed, giving somewhat more detailed description of the process, specific arrangements for the current meeting, and suggestions for getting the most benefit from the consultations. Specially designed evaluation sheets or questionnaires are also distributed to provide a systematic means of getting reactions to various aspects of planning and arrangements and suggestions for improvement. These evaluation sheets have furnished many of the ideas which form the basis for changes and improvements from year to year.

Enthusiasm for Program

The membership of the Southern Branch seems enthusiastic about the program innovation of curbstone consultations. Plans are to make them a continuing feature of the annual meetings, modifying and developing details of plan and procedure from year to year as experience may indicate. There have been rough spots, as would be expected with so new an undertaking, but these have been minor in comparison with the interest the programs have

stimulated and the growing evidence of their utility.

The curbstone plan appears to work well for professional meetings the size of the Southern Branch, but it may not be feasible for meetings of larger size. For larger meetings, it could, of course, be used as a feature concurrent with other program features, provided that satisfactory space and arrangements are available.

Success with the program depends on comprehensive planning and careful attention to

the details. It is hoped that other organizations will try the curbstone consultation plan, experiment with various ways of doing it, and make their experiences available to other professional groups. There is strong conviction that this innovation has a significant contribution to make to meetings such as those of the Southern Branch, but continuing experimentation is needed to determine the most effective techniques and to define more exactly the methods, limitations, and usefulness.

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The Partnership in Dental Health

By NELSON A. ROCKEFELLER

WHEN the Department of Health, Education, and Welfare officially came into existence last April 11, it lifted the vital health, education, and social welfare functions of the Federal Government to Cabinet rank. For the first time in our national history, these social responsibilities are represented at the highest council tables of our Government. Health, education, and social welfare have become an integral part of the considerations of the President's official family.

I think this is a logical outgrowth of President Eisenhower's beliefs which center around deeply held convictions concerning the dignity and worth of the individual. His actions in the field of social welfare are a striking example of this humanitarian philosophy.

To him, as to all of us, the problems of peace and war, of international freedom and stability, come first; for there is no individuality for Americans who are threatened by war or tyranny. Next are economic stability and growth at home—the ingredients without which individual growth is impossible. These are the cornerstones of President Eisenhower's foreign and domestic policies—freedom and peace on the international front, and economic stability and growth on the domestic front.

Mr. Rockefeller is Undersecretary of Health, Education, and Welfare. He presented this address, here somewhat condensed, before the 94th annual meeting of the American Dental Association at Cleveland, Ohio, September 29, 1953.

But there is a third element, an element which is encompassed in the broadest meaning of the term, "social welfare." The President has shown in his deep awareness of the fact that all three are inseparably formed together in a free society. The individual develops to his fullest capacity as a member of society only with the background of the best possible educational training. He must enjoy good health—physically and mentally. He must be secure in the knowledge of his protection in the event of extreme hardship, disability, and old age.

The Common Goal

In the field of dentistry and related subjects, the interests of the Department of Health, Education, and Welfare and of the American Dental Association touch at many points. The Department works with many professional associations toward the common goal—better health for each of our citizens. The Department works, of course, in different ways, using different resources and under different patterns of authority. But the objectives are shared objectives and many of the problems are mutual ones.

The Department, as you know, recognizes dental health as a matter of tremendous national importance. We are aware of the many complex and interrelated factors involved—manpower shortages, inadequate appreciation of the significance of dental health, the staggering backlog of accumulated dental needs, and economic barriers to dental care and services.

In this community of interests it is possible

to identify at least three sets of problems which are matters of immediate concern to the dental profession as well as to Government.

First, and perhaps foremost, is the problem of dental education and the needs of dental schools.

Secondly, there is the need for research in the various aspects of dentistry.

Finally, there are the problems involved in the application of scientific knowledge. In other words how can we make sure, within the framework of American principles of free choice, that the benefits of modern research and modern resources reach the majority of the people?

Before considering each of these issues in greater detail, it might be well to redefine the dental health responsibilities which are vested in the Federal Government. The Department operates under laws passed by the United States Congress. This is a basic fact too often misunderstood by the health experts and the public with whom the Department cooperates. As a Federal agency, the Department can do only what the law authorizes. A voluntary or professional health organization, as well as the private practitioner, can do anything the law—and their code of ethics—does not forbid. The distinction is an extremely important one and must be understood to appreciate the interactions of government and private agencies.

Most public dental health services today are provided by local governments. Federal responsibility is limited to research and experimentation, consultation, demonstrations, and, in some instances, to financial participation through research grants and through grants-in-aid to the States and local communities. Through these grants the Public Health Service and the Children's Bureau assist in the development and support of State and local dental health programs. The grants are administered by the localities according to their own needs and patterns. In theory and practice, therefore, the States and the Federal Government act as partners, each contributing to the job of improving the health of the American people.

The basic authority for the bulk of the Department's dental health activities is Public Law 755, passed by the Congress in 1948. This law, as you know, created in the Public Health

Service a National Institute of Dental Research. It directed the Public Health Service to "conduct, assist, and foster researches, investigations, experiments, and studies relating to the cause, prevention, and methods of diagnosis and treatment of dental disorders and conditions"; to "promote the coordination" of dental research; to provide fellowships and traineeships to qualified young research workers in dentistry; and to "cooperate with the State health agencies in the prevention and control of dental diseases and conditions."

The Problem of Dental Education

The Nation's dental schools are in or are confronted with serious financial difficulties. A recent estimate of the need, based on data collected jointly by your Council on Dental Education and the Public Health Service, indicates that the schools require \$43 million for construction to relieve overcrowded classrooms, expand clinics, and develop research programs; \$6.9 million to purchase equipment; and, not counting amounts reported as deficits, an additional \$8.2 million for adequate annual operations. Many schools rely excessively on part-time staffs, especially in the clinical departments.

Unless the financial status of dental schools is improved, the problem will have grave consequences for the quality and quantity of dental service in the future. More adequate support of dental schools seems clearly indicated to forestall any deterioration in dental education.

Potential sources for these funds, which need more exploration, are gifts from individuals and foundations and from industry. Recently, American industry has taken an active part in supporting the medical research effort of the Nation. It is an extremely significant and praiseworthy development. Members of the dental profession themselves, in the interests of good citizenship and the advancement of their high calling, can do much to enlarge the support of dental schools from all these sources.

The problem of dental education is basically, however, the problem of the university schools of dentistry. Here, the dentists of the future receive their basic training and education. Adequate facilities, resources and teaching per-

sonnel are necessary for both research and education in the field of dentistry. Continuing efforts must be made to provide adequate support to dental schools and institutes of research, because it is from these institutions that scientific advances in dental health will be made. The quality of dental care in the future, as in the past, will stem from these advances in both research and education and from their translation into preventive dentistry and dental practice.

Within the State and regional communities can be found the energy, the resources, and the know-how to solve these problems. It is not the job of local government alone; or of the local society alone; or of the practicing dentist alone; or of local philanthropy and civic enterprise. All of these groups and agencies, working together must—and can—find the answers.

The role of the Federal Government in the field of professional education is primarily one of fact-finding and analysis, stimulation and guidance. Federal subsidy or compulsory national health insurance is not the solution.

Expanding Dental Research

The problem of expanding dental research is related to, and, in part, a consequence of the financial crisis in dental education. The American Dental Association recognized early the potentialities of research in terms of dental health benefits to the Nation. With funds derived from its membership, it supported the establishment of fellowships at the National Bureau of Standards, the Armed Forces Medical Museum, and the National Institute of Dental Research.

These modest investments have paid rich dividends. For example, the research undertaken cooperatively by the American Dental Association and the National Bureau of Standards has developed processes and materials which have been widely adopted by industry. The research output of this program is followed eagerly by scientists of other nations, and it has had worldwide application.

Since the passage of Public Law 755, the Federal Government has been able to help in this field. Dental research in the Department

of Health, Education, and Welfare now ranges from basic physiological work to analyses of dental practices and of administrative patterns of organizing dental care.

Research studies include work on oral bacteriology and diseases of the soft tissue. Through the use of the electron microscope, the National Institute of Dental Research has advanced our understanding of the nature of dental decay and of the cell structure of dental tissue.

Another Departmental study is the Public Health Service's investigation of the use of chair-side dental assistants to increase the productivity of the individual dentist as well as the total output of dental services. Many dentists are already availing themselves of the services of trained assistants with decided effect.

The Public Health Service's 14-story Clinical Center at Bethesda, Maryland—which combines facilities for basic laboratory research and large-scale clinical observations—has set the stage for a fully integrated study of the major health problems of man. The Center contains facilities for research in the clinical aspects of dentistry and will enable our dental scientists to conduct studies on patients, with the help of basic research developed in earlier years. Projects are already under way in the study of oral tumors. Others are contemplated in the prevention, diagnosis, and treatment of dental diseases. Our aim in this research—as, indeed, in most of the Department's research—is to find and make available to the private practitioner the tools and techniques which will enable him to do a better job.

Probably the best known research is that which established a relationship between the amount of fluoride in water supplies and the extent of dental decay, and the subsequent and continuing work on the prevention and control of dental decay through fluorides.

But Public Health Service research has gone beyond the dental effects of fluorides. Data have been accumulated on the general effects of fluorides on the functioning of the body, and we are acquiring considerable engineering and chemical information on the water fluoridation process. In fact, one recent finding has been the demonstration in the laboratory that even under extraordinary conditions of mineral or

dietary stress, fluorides in the recommended concentrations do not become toxic.

The Public Health Service is continuing its own research and is watching closely the work of others in this field. We intend to leave no stone unturned in our constant vigilance to protect the public health and safety of the people of this country. I am delighted to see, in view of our findings and those of other research workers, that the American Dental Association has taken the lead in this field of public health. Research offers seemingly limitless possibilities in the control and prevention of dental diseases. The Federal Government has played, and will undoubtedly continue to play, a significant role in dental research.

The challenge to the profession is clear. Knowing the seriousness of dental disease and its costly impairments to health, the profession must seek to stimulate new interest on the part of individuals, foundations, and industry in the problems of dental health. There are many avenues for research which hold great promise that can and should be explored.

The Application of Scientific Knowledge

The application of valid research findings must be hastened, and the best possible dental care must be available to all people.

Our earliest knowledge of dental needs stems from a survey of 14½ million children which the Public Health Service carried out in collaboration with the American Dental Association in 1933-34. I cite this not only as the earliest instance of cooperation between our organizations, but also as a particularly good example of the kind of teamwork in which we believe. The Public Health Service worked closely with some 8,000 local dentists, with State and city departments of health and education, and with State and local dental societies.

As to the Nation's unmet dental needs, the best available evidence suggests that despite the universal occurrence of dental disorders, less than one-third of the population receives anything approaching adequate dental care each year. Although more than \$1 billion was spent for this care by Americans in 1952, it

remains true that many millions of our citizens are either receiving no care or, at best, very limited services.

The opportunity to secure dental care is a fundamental need of every individual. The ideal of dental care for all, however, cannot be realized immediately. Good sense suggests that we place greater reliance upon local initiative and interest. Aggressive support and participation by the community are essential ingredients.

Various experiments have been undertaken which demonstrate the almost limitless potentialities of this idea. Consider, for example, how one small community in Minnesota, with no resident dentists, made dental care available to all children, regardless of income or geographic location. A revolving fund from contributions by families of the community was set up. Interest-free loans to needy families were made for the purpose of financing children's dental care. The families have free choice of any 1 of 6 private practitioners in the county, who provide the care in the school dental office of the community. This is a dramatic example of how a local community voluntarily mobilized its resources to meet a local need.

One largely rural State, North Carolina, recognizing the need for additional dental manpower, appointed a dental college committee as long ago as 1921 to press for the establishment of a dental school within the State. The concrete results of that effort will appear in 1954, when the school graduates its first class. The yearly addition of 40 to 50 dentists will appreciably increase the supply and tend to equalize the distribution within the State. In addition, this State has displayed energy in organizing treatment of underprivileged children by private practitioners and has given thought to scholarship assistance to residents to attend dental school.

These are but two examples among thousands of what can be done through local leadership to provide adequate support for dental care in accordance with the need at the community level. It is a great challenge—a unique opportunity for initiative and imagination in the service of one's fellow men.

Agenda for a critical exploration of Current Problems in Medical Care

By E. M. BLUESTONE, M.D.

Here is a catechism—but with questions only. The author draws here upon his extensive experience in hospital administration and his pioneering work at Montefiore Hospital in New York to ask, cogently and incisively, the perplexing questions current today in the fields of hospital and medical services administration. When originally presented last December his audience was United Community Services of Metropolitan Detroit, but his "agenda" is for all who plan and direct the course of health and medical affairs in private and governmental hospitals, in public health, in social service, and in the civic and official organizations of the community. From them the answers must come.

THE MODERN STUDENT of medical care seems almost to be laboring under an embarrassment of riches these days, so much successful experimental material is at his disposal. Social and medical possibilities are clamoring for conversion into actualities at such a rapid pace that the planner is left breathless in the process. We shall have to excuse his enthusiasm on the one hand and his disappointment on the other when he finds the going slow. Opposition must be met, satisfied, or overcome. New problems are sometimes created as old ones are solved. The best example of this seeming paradox is found in the lengthening of the life span, which, however desirable, brings with it the necessity for making the later years comfortable. The problem in procedure is therefore how to apply new remedies for old difficulties and how to find additional remedies—an unending chain.

The most extensive, and perhaps the most dif-

ficult, of the basic problems is the one the patient exhibits when he is suffering from prolonged illness, whether he is ambulatory, bedridden, or alternating between the two. Here is an exceptional case in which the solution of one major problem automatically liquidates a great many others. Relieve the chronic difficulty and the acute difficulty will be relieved in the process. Since one of the penalties of greater longevity is that it takes a longer average time to die than ever before, we are all the more constrained to deal with this manifestation intensively. That the approach is social, economic, and political, as well as medical, goes without saying. The family and the environment play a major role in any consideration of such a subject. Preventive medicine and environmental medicine hold many keys that are ready for use.

Listed here are some of the items on the agenda of unfinished business, with explanatory

notes, for the consideration of the participants as they deliberate such questions at the council table. Each of these items calls for decisive action and each requires a combination of social and medical techniques in research, which are at our disposal, ready for study and application.

1. We need a definition of such terms as "acute," "chronic," "convalescent," "custodial," "aged," "hospital," "home," "curable," "incurable," "social medicine," and "socialized medicine." At the moment, the sick man suffers patiently while those who plan for him too frequently permit themselves to be confused by these terms.

At what point, for example, shall we separate acuteness from chronicity? Can we establish a common denominator for the two and use it for all practical purposes? What is the impact of duration of illness on the provision of medical care, and does the service correspond to the requirements of the case? How is a convalescent patient distinguished from a so-called chronic patient? Is there any advantage in providing for the elderly separately and apart from all other social and medical services? Or is it better to identify them with all other age groups in accordance with their social and medical needs? When are we justified in labeling a patient "custodial" with regard to medical care? At what point, if any, during the course of illness is a hospital justified in dismissing a patient and transferring him to less capable hands?

It is easy to see how hospital policy can be revised and formulated on a more equitable basis when such questions are answered correctly and in absolute terms in relation to each other.

2. The trends in medical care for each of these definitions need stating, particularly with reference to prolonged illness (formerly known hopelessly as chronic disease) and the aging process. Most of these are well known, even though we resist their full acceptance, while others still wait to be brought to public view in a practical way. There is, for example, the continuing trend toward finding new ways of closing the gaps in hospitals between (a) acute and chronic; (b) income and expenditure; (c)

space demand and space supply; (d) social service and medical service; (e) intramural and extramural care; (f) current medical economics and the science of medicine; and (g) principle and practice generally.

This involves the consideration of such things as voluntary prepaid insurance plans, including group medical practice; home care for those who do not require a hospital bed; and substitutes for the patient's home under the medical jurisdiction of the hospital for those who do not require a hospital bed and cannot be taken care of in their own homes, either immediately or by subsidy of one kind or another. The outpatient department's services will have to be considered; provision of doctors' office space on hospital premises; the integration of tuberculosis and mental disease in the work of the general hospital; the principle of full-time medical service in hospitals; the shifting emphasis in medical education; and the reunion (including the integration) of health and medical care. The obvious purpose in appraising these trends is to apply them productively to plans for medical care.

3. We need an evaluation of social and medical pressures, tensions, and resistances in connection with illness in all its forms. What is the quality and quantity of these individual and communal phenomena emanating inside or outside of the hospital? Are they well based, honestly applied, and helpful? How much anxiety, as well as eagerness, is associated with them, and, if these pressures are well-founded, how shall we deal with the resistances which they may create? The answer to this question will take us beyond the realm of statistics. Workers in the field are constantly exposed to these manifestations and are sometimes caught between the proverbial millstones. This subject must be treated at the council table with statesmanlike understanding.

4. A practical formulation of the scientific requirements in the management of prolonged illness is needed. This refers both to medical necessity and to social necessity, evaluated with scientific accuracy wherever possible, but with the realization that a sick person must never be subjected to the rigid standards of the exact

sciences. Scientific requirements go beyond the goal of certain well-meaning philanthropists who feel that food, shelter, and clothing (custodial care) are all that may be required by a person who has the misfortune of living under a prognosis of incurability.

5. We need a forceful statement on the menace of rigidity in hospital planning, and this refers to function as well as to structure. In particular, we must be alert to this menace when we plan for prolonged illness, because rigidity commits the hospital "in bricks and mortar" over a long period of years during which adaptations will undoubtedly be required. One of the architectural problems is how to get flexibility of design so that adjustments to changing conditions may subsequently be made easier.

6. We need a reaffirmation of the principle of individualization of care for patients under all circumstances. There is now the possibility of home care programs, which, in turn, stimulate greater interest in individualizing the care of patients who have no choice but to enter a hospital.

7. Among the supporting statements for the various items on this agenda should be a well-reasoned critique of the older and still prevailing methods of dealing with prolonged illness in homes, hospitals, and elsewhere. Only on the basis of such studies will revised plans for patient care find acceptance. We must be sure that we are dissatisfied with what we have and profit from experience before we adopt substitutes. A conservative point of view requires the strongest hypothesis to justify any kind of experimentation.

8. The criteria for admission to any hospital will have to be redefined and restated in the light of the deep-seated changes which the laboratories of modern medicine have been offering. Having emerged from the prescientific era, we are now in a position to get a better turnover of hospital beds or offer them to patients for longer periods, as necessary—so long, in fact, as they may have to remain close to the highly concentrated diagnostic and therapeutic facilities of the hospital. The new resource of

home care can relieve the hospital of the necessity for retaining any other kind of patient within its walls.

9. As the policies which govern the admission of patients to general hospitals are rewritten, we should, at the same time, outline the criteria for the retention of the patient in his own home. Under what circumstances is he best cared for in this way?

10. Another item on the agenda is a recommendation on the criteria for the transfer of a patient, either from the hospital or from his home, to a substitute for his home. If a home for the aged, like a so-called home for incurables or a nursing home, should be a substitute for the patient's own home, then we should restate the conditions under which guests may be admitted and retained in these establishments. We must, however, keep in mind that these institutions are substitutes for the patient's home and never for the hospital.

11. The time has come to restate the special criteria for admission to homes for the aged. If we are to discontinue the practice of establishing so-called hospitals within homes for the aged, there is all the more reason for revising the conditions for admission. In the rare instances in which a home for the aged has been able successfully to establish a hospital within its walls, it has in fact added another hospital to the community. In order to establish a hospital within a home, the institution must be prepared to meet the challenging clinical problems which characterize prolonged illness and age in general. It should be able to absorb acute medical and surgical cases without further effort. Such an institution is indeed compelled to do this in emergencies. In connection with this item we must consider the relationship of a home for the aged, which as I have already pointed out is a substitute for the patient's own home, to the general hospital from which it should be able to draw medical sustenance.

12. What criteria shall we recommend for admission to custodial establishments generally? These decisions should follow the lines

recommended for an institutional home for the aged.

13. If, after careful study, we find that it is virtually impossible to maintain a convalescent establishment solely for this specific purpose, what shall we do about it? This establishment, too, is a substitute for the patient's home and not a substitute for the hospital. If a convalescent patient is safely on the road to partial or complete recovery from acute or chronic disease, his requirements will doubtless be about the same as those for anyone who is recuperating from overwork and seeks a change and rest on a farm, in mountainous areas, or at the seashore. We must not confuse the convalescent patient with any other type of patient, for if we do, we shall perpetuate a confused and distorted plan of medical care which makes of the convalescent institution a catchall establishment for the admission of patients (with the possible exception of mental and tuberculous patients) who may not be acceptable to the "acute" general hospital.

14. Though much is being said about the place of the tuberculous patient in the general hospital, we are still far from translating this principle into practice. How can the care of the tuberculous patient be integrated with the care of all other patients in the general hospital and what conditions should govern his admission? The active treatment of this disease, based on modern scientific knowledge, and the passive treatment, which characterized the care given previously and still being given, should be evaluated from this point of view.

15. Almost the same questions apply to the mental patient in the general hospital. What are the relative advantages of integration in a general hospital as compared with isolation and segregation in a distant special hospital? If integration is desirable, what is the best kind of experimental beginning and how can the hospital trustee be made receptive to such new ideas?

16. If integration is not accepted as a wholesome trend in the management of the tuberculous or the mental patient, what alternative

structural and functional plan can we safely fashion? Specifically, we have yet to express ourselves firmly on the place of the mental patient in (a) the mental institution, (b) the home for the aged, (c) the home for incurables, (d) the nursing homes, and (e) all other custodial types of institution. Much of this applies to the tuberculous patient. To what extent is it desirable to alienate either of these patients from the environment generally, to which they will be expected to return, and their families.

17. An essential part of the study of this pressing and vital problem is an item about the significance of a waiting list of patients for admission to a hospital and rejected applicants for admission. What is the effect of a waiting list on hospital morale as well as on the patient himself? At this point there must be an offer of alternative methods of care. This study would be incomplete without a thorough analysis of rejectees in any medical establishment. A hospital must not only know and understand what it does, it must know and understand what it does not do, and then help to make good the difference.

18. No study of medical care can be complete without an analysis of the relationship of housing in the community to the program of hospital care. Throughout the ages at least one reason for the existence of the hospital has been the inadequacy of home facilities during certain phases of illness. Such an analysis would lead into a field of study which would produce, in the end, far better use of hospital beds than we have thus far seen, while individualizing the care of the patient outside as well as inside of the hospital.

19. The requirements of good chronic care as seen from the angle of social (environmental) medicine should be considered carefully. A clear statement should be issued after careful study of these requirements, and facilities should thereafter be adjusted to meet these requirements. Specifically, is the home for incurables, home for the aged, convalescent home, nursing home, or hospital for chronic diseases, the best place for this kind of patient? If so, why? If not, why not?

20. How shall the vicious circle between poverty and prolonged illness be broken? At what point does a person require the kind of assistance, social or medical, which will prevent poverty from precipitating prolonged illness and prolonged illness from precipitating poverty? In the long run, they do their deadly work together.

21. What standards should be recommended for the establishment of substitute homes for the homeless patient and for the home-poor patient when intramural hospital service is not indicated? Should medical facilities be added to these substitute resources and, if so, to what extent? If not, how can these substitute homes be related to the work of the general hospital? In some instances only a custodial type of care is required, but in more instances continuous medical care is required. If general hospitals transfer their undesired patients to less capable hands at a time when scientific medical care is most needed, how shall this practice be controlled?

22. In the analysis and the evaluation of the reasons for the current practice of transferring patients from the so-called acute general hospitals to second-class institutions, we should deal specifically with (a) the financial reason for transfer, including a statement of remedies; (b) the medical reason, including a statement of remedies; and (c) lack of space, including a statement of remedies.

23. How shall we define and evaluate for practical purposes such new terms as "geriatrics" and "gerontology" in relation to medical care? What are their possibilities and what are their limitations? Is geriatrics a separate specialty like pediatrics, or a problem in acute illness or prolonged illness as the case might be? In other words, at what point in the calendar of a man's life are we justified in making any kind of arrangements for his medical care that may deprive him of the best that is available to those who were born into the world after him?

24. What is the relative emphasis that is being placed on various phases and stages of ill-

ness and, in particular, the duration of illness? To what extent does the pressure of urgency dominate planning and how much consideration can be given to nonurgent conditions, which may, in fact, be far more frequent and far more devastating in their prolonged effects?

25. An important item on the agenda is the need for placing responsibility for correct and up-to-date planning. Who is responsible when a person is deprived of the kind of social and medical care that he may need at various critical periods in his life? There must be a level at which responsibility can be fixed. What is this level and how shall it be controlled?

26. Since prolonged illness characteristically exhibits diminishing financial returns from patient sources, how shall we make up the social and medical deficit to enable us to restore the sick man to partial or complete usefulness in his community? What are the relative positions of government and philanthropy in an effort like this and what is the position of the practicing medical profession toward this financial problem which involves them automatically? Can we buy medical time and medical interest with money and with opportunity? If so, under what conditions?

27. As we deliberate on the question of financial currency in relation to the care of the patient, we should give some thought to clinical currency. Specifically, to what extent should such a subject as prolonged illness influence medical education and medical research in the hospital, in the home, and in the substitute for the patient's home?

28. An important item on the agenda is an open-minded study of the principle of full-time medical service in the top clinical and laboratory divisions. What are the relative merits of full-time hospital service and the kind of prevailing voluntary service in hospitals which compels intramural and extramural competition for the service of physicians?

29. Since the poor may always be with us and since the intermediate type of institution—too often a substitute for the general hospital—

will doubtless prevail for some time to come, what structural and functional obligations shall we impose on it? I refer here specifically to the possibilities of preventive medicine at one end and rehabilitation at the other.

30. What responsibility shall be assigned and what agency shall publicize any new patterns which may evolve? What methods shall we recommend to obtain the acceptance of the public generally as well as interested persons specifically?

Omitted from this presentation are those problems in political economy which, to be sure, have a strong bearing on the agenda. While I am concerned primarily with good medical care for everyone, regardless of age, social condition, duration of illness or the illness itself,

environmental medicine teaches that employment and a good economic background are prime factors in preventing disease or its consequences. Business and industry have a strong contribution to make in prevention, first by the application of the principles of industrial hygiene and occupational medicine, and second by encouraging a program of rehabilitation that will enable the recently sick to return to work. Fortunately, much successful experimental evidence is available to enable us to reach decisions on most, if not all, of the items enumerated in this agenda. We are left, therefore, with the need for adjusting the social and medical resources evolving patterns of care. Needless to add, there are many opportunities for additional experimental work on a continuing basis until problems like these can be resolved.

Public Health Service Staff Announcements

Dr. Sidney Farber has been appointed to serve on the National Advisory Cancer Council of the Public Health Service for 4 years beginning October 1, 1953. Dr. Farber is the scientific director of the Children's Cancer Research Foundation, Boston, professor of pathology at the Harvard University Medical School, and chief pathologist of the Children's Hospital, Boston. Since November 1947, Dr. Farber has served the National Cancer Institute of the Public Health Service as a special consultant on clinical research problems. He is well known for research on the chemotherapy of cancer in children, particularly leukemia.

Dr. Floyd S. Daft has been named director of the National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, by the Surgeon General of the Public Health Service. Dr. Daft, acting director of the Institute since the retirement of Dr. Russell M. Wilder on July 1, 1953, had been assistant director of the Institute and chief of laboratory research since 1951. A member of the scientific staff of the National Institutes of Health since 1937, he has directed nutrition studies, particularly on the B vitamins, and conducted a study of the substance later identified as folic acid. His in-

vestigations have contributed to the understanding of dietary deficiencies causing anemia, cirrhosis of the liver, and other metabolic diseases.

Dr. Maurice C. Pincoffs has been recently appointed to serve on the National Advisory Arthritis and Metabolic Diseases Council by Surgeon General Leonard A. Scheele of the Public Health Service. Dr. Pincoffs has been professor of medicine at the University of Maryland since 1922, and is president of the Medical and Chirurgical Faculty of Maryland, regent and a recent president of the American College of Physicians, and councilor and ex-president of the American Clinical and Climatological Association. For many years, he has been editor of the *Annals of Internal Medicine*.

Dr. Russell S. Boles, internist and gastroenterologist, Philadelphia, and **Dr. Thomas P. Almy**, associate professor of neoplastic diseases, Cornell University Medical College, have been appointed to the Cancer Control Committee of the National Cancer Institute, Public Health Service. Their 4-year terms are effective October 1, 1953. Dr. Boles succeeds **Dr. Charles F. Branch**, Lewiston, Maine, and Dr. Almy succeeds **Dr. Edmund G. Zimmerer**, Des Moines, Iowa.

Psychiatric Rehabilitation in the Community

By RICHARD H. WILLIAMS, Ph.D.

ANY FULL-SCALE PROGRAM in psychiatric rehabilitation must concern itself not only with what can be done for mental patients in the hospital (1) but also with what actually happens in the community. What services, if any, are given, and what might be done after the patient leaves the hospital?

It would indeed be fortunate if a mental patient could leave the hospital with the mental disease either cured or arrested, and also be completely "rehabilitated," so that he could at once assume his optimal role without further help or specialized attention. Such is obviously not so, in fact. Adequate statistics on rates of readmission to mental hospitals are not available. We do know they are high. It is a fair guess that they are significantly higher than they might be with concerted rehabilitative efforts in the hospital and in the posthospital period. In New York State, for example, one-third of all admissions to mental hospitals in 1947 are readmissions (2). Readmission rates, where available, may underestimate the

problem, however, because patients returned from convalescent care or from some status other than full discharge may not be counted.

The extent of rehabilitation cannot be fully measured by readmissions because the patient may fall considerably short of his optimal social role even if he succeeds in remaining out of the hospital. Still more basically, it can never be expected that all patients can be fully rehabilitated on leaving the hospital, because the protected hospital setting is, of necessity, significantly different from many of the situations to which patients return.

Efforts can and have been made to simulate pressures of the outside world in hospital settings. For example, patients may be put through a graduated series of work tasks in which more and more rigid scheduling is involved. But the patient is still "protected" in the very special hospital sense, and there is the problem of readjustment to more normal social situations.

The Meaning of "Community"

Psychiatric rehabilitation has already been defined (1). But what is meant by "psychiatric rehabilitation in the community"? The term "community" is used in a variety of meanings. Within the social sciences, it can be used broadly and analytically to refer to persons who share or participate in something in common, for example, a community of language.

It may be used more narrowly to refer to persons who share the basic conditions of a common life, for example, geographic territory,

Dr. Williams, social science research consultant with the National Institute of Mental Health, National Institutes of Health, Public Health Service, discussed the psychiatric rehabilitation of mental patients in the hospital in the November 1953 issue of Public Health Reports, p. 1043.

Public Health Monograph No. 17, a review of the literature on rehabilitation of mental hospital patients, is being concurrently published with this issue and is summarized on p. 1237.

basic educational, medical, and other services.

It can be used still more narrowly to refer to people who share the basic conditions of a common life and who identify themselves as a primary group. In this last sense, many people do not actually live in communities today, and the most typical examples of communities would be found in peasant villages, or among certain nonliterate people.

The term "community" is frequently, and on the whole rather loosely, used in discussions of problems of health and welfare. It is often difficult to pin down just what is meant, other than known interactions between clients and specific health and welfare agencies.

For present purposes "community" will be defined very broadly and residually to refer to whatever nonhospital setting patients go on leaving the hospital. This definition is broad because little is known about what the "community" is and what it means to former mental hospital patients. An important, initial step in posthospital rehabilitation research is precisely to determine the dimensions of the community to which the patient returns. In a general way, it may involve his relations to a family, a job, a circle of friends and acquaintances, his participation in various organized groups or in civic affairs, and his identification with smaller or larger local groups, including his nation. As research proceeds, community functions and structures as they affect the life of the expatient can be identified much more exactly.

Subdividing the General Problem

A fundamental first step in adding to knowledge of rehabilitation in the community is to make a detailed analysis of the real social world to which a patient returns, whether or not a formal intervention by health or welfare agencies occurs. We need to know:

The type of family, if any, to which he goes back.

The degree of his isolation from, or participation in, primary groups (family, close friends, cliques).

His relation to the occupational world and many other aspects of his group identifications.

The informal institutions, basic cultural

forces, and commonly shared attitudes into which he plunges.

The major objective is not to document these situations historically for each individual patient but rather to determine general patterns which affect large numbers of patients and to assess the rehabilitative or illness-producing values of forces within these patterns. Ultimately, the objective is to find modes of intervention which will increase the rehabilitative value of the total situation. This phase may be called the basic analysis of community structure and functioning.

What kinds of treatment, assistance, or support do patients need after leaving the hospital? These include emotional support, assistance in various kinds of economic and occupational adjustment, and help with living arrangements and social activities. A basic question is the optimal amount of support needed, for there can undoubtedly be too much as well as too little support, and disfunctional passive-dependent attitudes might develop.

How, and by whom, can the treatment, assistance, or support best be supplied? What should the role of the hospital and of the various hospital personnel, such as psychiatric social workers, be after the patient has left the hospital? What kinds and amounts of clinic facilities are needed? What is the extent of the role of the vocational rehabilitation agency? Probably various agencies will be involved in the total rehabilitation process, and effective coordination of their efforts is an important aspect.

What kinds of information—through what channels, to what audiences—might build up communitywide attitudes which would facilitate the rehabilitation process? Basically, what can and should be communicated to whom? A considerable body of general knowledge has been built up in the field of communications research, but, as yet, it has not been systematically applied to problems of rehabilitation.

Some Plans for Analysis

There are a few people throughout the country who have developed some empirical knowledge or who have had some professional training in relation to these problems. However,

we are far from having a systematic body of knowledge about psychiatric rehabilitation in the community which could be communicated and utilized in program development.

As a first step in this direction the Public Health Service's National Institute of Mental Health has recently made a grant to the Harvard School of Public Health to explore the problem and to develop a research design for a full-scale analysis of the Whittier Street area of Boston.

This area, as described by the staff at Harvard, has been the focus of considerable and continuing ecologic and demographic analysis and is currently being used for training and research by the Harvard School of Public Health in cooperation with the City of Boston Health Department. Thus, much of the costly background investigation has already been carried out.

Previous analysis showed that the area has a population of about 60,000, includes a wide distribution of cultural and socioeconomic groups in its 11 census tracts, so that it is possible to compare one subgroup with another. There are three main ones: a very low economic group, primarily Negro, with a stabilized population and a high illness and accident rate; a predominantly Irish working class group, with a stabilized population and a moderately high illness rate; and a middle-class apartment house area, with a geographically mobile population and a low illness rate. Preliminary analysis suggests that annually approximately 100 patients from the Whittier Street area are admitted to Boston State Hospital alone. An equivalent number are presumably discharged from the hospital.

Research techniques in the Whittier Street area will include observation and interviewing in the field, as well as the use of statistics and intensive case studies. During the pilot study phase there will be opportunity to develop and suitably adapt sociologic and anthropological techniques and concepts for this particular type of research. The socioecologic and illness-incidence information already available on the population of the area should provide a strategic baseline for intensive analysis and efficient sampling in the selection of patients and families to be interviewed. It should thus be possi-

ble to compare patients' families with socially and culturally similar families to disclose possible significant variables in interpersonal structure and emotional climate contributing to emotional or mental disorder in family members.

Research of this type should contribute not only to a better understanding of the problems of rehabilitation as such and furnish a sound basis for program development but should also add significantly to basic understanding of sociopsychological factors in mental disorders.

Bridging the Wide Gap

There are, and probably always will be, basic differences between the structure of the hospital and the structure of social situations into which patients go when they leave the hospital. There is growing awareness that at present the resulting gap between the hospital and the community is quite wide indeed. This "psychological distance," as Schwartz calls it in Public Health Monograph No. 17 (3), may well account for the relatively large number of failures among discharged patients on the one hand, and for reluctance to discharge many other patients on the other hand. Thus, if the gap could be narrowed or, better still, actually bridged, there could be significant increases in the number of successfully rehabilitated mental patients.

The several ways in which this gap could be bridged may be classified into four main areas, each one of which will require major efforts in research and program development.

The Hospital Itself

Changes within the hospital, including administrative changes, the addition of rehabilitative services, and increased interaction between the hospital and community could make the gap less extreme. There is already a tendency for mental hospitals to be less isolated geographically and socially. There are efforts to bring in more of the outside world as patients are ready for it. Hospital personnel are becoming more aware of working closely with other agencies in the community.

The Patient's Immediate Contacts

It should also prove valuable, while the patient is still in the hospital, to work with the

people who are "significant persons" to the patient—his family, friends, employer, minister, and the others. They could be better prepared to receive the patient and to foresee the problems he will have when he returns. Also, by this same process, much could be learned concerning the patient, his problems, the situations from which he has come, and the situations to which he could or could not return.

Transition Rehabilitative Services

Direct rehabilitative services to the patient after he leaves the hospital could lessen the more extreme changes and severe adjustments in making the transition to a nonhospitalized pattern of life. This could include provision of outpatient clinic services for continued therapy or emotional support, the services of the vocational rehabilitation agency in providing counseling, guidance, placement, and, for some patients, training, services for family counseling and guidance, and possibly others.

The Halfway Shelter

Increased facilities of the character of a halfway house to act as a very specific bridge may prove to be highly desirable and valuable. Schwartz (3) has analyzed several such attempts, and Jones (4) has described a number of arrangements of this type found in different countries. They may take the form of special living arrangements where expatients can find some protected shelter and mutual support, plus a minimum of professional help. The expatient can begin employment, contribute to his own support, be much less of a burden on public funds, and learn gradually to live in the outside world.

Expatient clubs without living arrangements can also be of value. They have been tried with some success in England and on a smaller scale in the United States. Provision for foster homes or other kinds of home care with one or sometimes more patients present in the household also appears feasible and valuable. On the basis of past experience, it is particularly important to have careful selection and preparation of the family and of the expatient, and to have good but not overdone publicity by press and radio to build receptive attitudes in the community generally.

Sheltered workshops can be a valuable bridge in the occupational sphere and provide, as well, a more permanent place for patients who may never be able to function in most occupational settings. But, again, research of the general type indicated above should provide important guidelines for the development of any of these plans or for several of them in combination.

Adjusting to the Community

On the other hand, we should at least be aware of the possibility that for some patients the gap between the hospital and the community may be in a sense not wide enough, or in another sense, of a very special type.

Take, for example, the situation of the patient living in an open ward. He has ground privileges and can go downtown on occasion. He may have made some close friendships and developed group identifications within the hospital, but he may also have lost all contact with family and friends on the outside. He may have achieved a satisfying vocational adjustment in one of the hospital industries, and, of course, he has an assured place to sleep and three meals a day. He has, in effect, brought the "community" into the hospital. Any other "community," on the "outside," would have little, if any, appeal, and might even be quite frightening. Such an adjustment may be fairly "good" from the point of view of the patient but costly to the taxpayer.

How can a program motivate such patients to move on into a more independent and productive status, without doing something to destroy the values of improved hospital care and improved in-hospital adjustment? This problem, too, must be faced in any operationally significant research on rehabilitation on mental hospital patients.

Developments in Vocational Rehabilitation

Small but important beginnings have been made in furnishing the services of State vocational rehabilitation agencies to persons with mental and emotional handicaps. Since the passage of Public Law 113 (78th Cong., 1st sess.) in 1943, several States have developed

specialized programs for psychiatric clients. In some States, a vocational rehabilitation counselor has been assigned full time to a mental hospital. In other States, increasing numbers of such cases have been added to the general caseload. Rennie, Burling, and Woodward (5) have estimated that about 15 percent of the patients who leave mental hospitals need the services of vocational rehabilitation. This figure has been cited frequently since the publication of this pioneering study in 1950. It may underestimate the potential use of such services because of the relative newness of the vocational rehabilitation program and because of the relatively small numbers of cases on which experience has been built thus far. In any event, less than 15 percent of these patients are receiving such services now and there is room for much development in this field.

The National Institute of Mental Health, in collaboration with the Office of Vocational Rehabilitation of the Department of Health, Education, and Welfare, has recently been active in stimulating special training programs for vocational rehabilitation counselors who are working with or who might work with mental patients. Three institutes were sponsored during 1952-53 and three more are planned for 1953-54, making it possible in each of these years for each State to have at least one member of its staff to attend. An analysis has also been made of the background of some of the people working in this field. They were found to be an unusually mature, stable, and highly motivated group. They are beset by many of the strains of a new profession, particularly the strains of budget. There tends to be some pressure to increase the numbers rehabilitated, because dollars-and-cents justification is possible and does make sense in this work. But, by and large, they have developed some very successful programs. However, it was also found that there are urgent needs for further training and research results and for more effective utilization and coordination of all resources in the community. Much of the success so far is based on the practical experience of individual counselors and a few empirical and commonsense principles which have not been systematically explored or analyzed in readily communicable form.

Some Indications of Payoff Value

Rehabilitation can and does pay off in dollars and cents. It can produce substantial savings in costs of hospitalization and even more substantial savings in increased earning power of rehabilitated patients, and, hence, a more effective utilization of our national manpower. Furthermore, rehabilitated patients pay taxes on their earnings which offset the costs of vocational rehabilitation services.

Numerous figures have been compiled for vocational rehabilitation in general, for example: "The 60,000,000 disabled persons rehabilitated in 1950 added an estimated \$93,000,000 to the national income the first year they were rehabilitated—more than three times the amount expended for rehabilitation services in the same period and about five and one-half times the annual rate of \$17,000,000 earned by these individuals at the time they were accepted for service" (6).

Figures indicating costs and savings in the total rehabilitation of mental patients have not been compiled. However, in an analysis made of one State program by the National Institute of Mental Health, it is clear that savings through vocational rehabilitation of mental patients were substantial. In the first 4½ years of the period analyzed, during which a vocational rehabilitation supervisor was assigned full time to the State hospital, 238 cases were closed as rehabilitated. The rehabilitated patients earned a total of \$256,304. This figure would give a fictitiously low average, because a number of the patients counted had been out of the hospital and earning salaries only a few weeks at the time of the study; the average weekly wage is about \$50. The costs of keeping them in the hospital during the period they were employed and out of the hospital would have been \$449,222. Thus, there was a gross gain in values produced and in savings of \$705,526. If we estimate that they paid 15 percent of these earnings in various taxes, there was a tax return to the public of \$38,445, or a gross gain to public funds of \$487,667. The program cost \$6,478 in direct services to clients (tuition for training, and other costs), and \$46,358 for guidance and professional services, or a total of \$52,836. If we attribute all of the

hospital savings to the program, there would be a net gain of \$434,831 in public funds. Some of these patients would have been out of the hospital without the program. However, we only need to attribute about 5 percent of the hospital savings to the program to have it pay for itself in public funds alone, and undoubtedly the program accounts for several times this amount.

These figures look, and are, convincing. However, too much insistence on this type of argument is likely to create pressure to turn people out in quantity. Cases are sometimes closed too soon and cases which do not need service are taken in order to make a better record. We should always bear in mind that we are not producing machines on a mass production basis. Rather, we are attempting to help people lead more satisfactory lives which in turn create many intangible values not only for themselves but for those with whom they are associated. Some of these values are more difficult of measurement. However, it seems quite safe to conclude that programs in reha-

bilitation have a very high potential payoff, both in terms of values which can be measured directly in dollars and in terms of the less tangible human values which cannot be so measured.

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Cancer Control Letter Discontinued

Publication of the monthly *Cancer Control Letter* was discontinued, by direction of the Bureau of the Budget, with issue number 67 dated September 1, 1953. The National Cancer Institute of the Public Health Service had issued these reports as a service to public health officials, voluntary health agencies, educational institutions, and others concerned with cancer control activities and techniques. Every effort will be made to supply the information furnished previously by the Letter through publication in *Public Health Reports* and other publications and agencies.

The Literature of Rehabilitation Of Mental Hospital Patients

Within the past few decades personnel working with hospitalized mentally ill patients have increasingly shifted the conception of their purpose from custodial care to reeducation and reintegration of the patient into his community. They have become more aware of the necessity for treating the patient as more than a carrier of a disease entity. The new concept of rehabilitation of the mentally ill is the rubric under which a wide variety of activities is carried on. However, despite the growing body of published reports regarding rehabilitation practices, there has been no general survey of the literature in this field. Public Health Monograph No. 17 reports an analysis of 189 selected articles in this field published in the United States between 1944 and 1952.

Writers have defined "rehabilitation" in various ways, depending upon their purposes and viewpoints. Rehabilitation has been conceived of as the activities which bring about patients' recovery, the process by which patients recover, the goal of the services provided, or a phase of the treatment given. In this report an operational definition was used. Rehabilitation is defined by indicating what is being done to aid patients to function outside a hospital setting. The report does not cover specific medical therapies or psychotherapy.

Five questions are considered:

1. What is the unit of rehabilitation? In other words, what aspects of the patient or patients must be considered in a rehabilitation program and what are the number, kinds, and organization of personnel necessary to carry on rehabilitation services? Five currently used approaches are described: the individual approach, the team-individual approach, the pa-



Public Health
MONOGRAPH

No. 17

The accompanying summary covers the principal points discussed in Public Health Monograph No. 17, published concurrently with this issue of Public Health Reports. The author is with the National Institute of Mental Health, National Institutes of Health, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities and in selected public libraries.

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Schwartz, Charlotte Green: Rehabilitation of mental hospital patients. Review of the literature. Public Health Monograph No. 17 (Public Health Service Publication No. 297). 76 pages. U. S. Government Printing Office, Washington, 1953.

tient group-individual staff member approach, the patient group-staff team approach, and the interpersonal relationship approach.

2. What is the process of rehabilitation? The differences in the conceptions of how rehabilitation occurs are pointed up by classifying activities in terms of the major focus of the writers. It is shown that relationship therapy, patient-patient relationships, group psychotherapy, psychodrama, group discussions, therapeutic social clubs, group work, and patient government are mainly conceived in terms of the interpersonal relationships involved. On the other hand, occupational therapy, music therapy, art therapy, recreational therapy, and corrective therapy are conceptualized primarily in terms of the activities involved. Attempts to combine both approaches in total push programs are examined.

3. Which staff attitudes toward patients are thought to be therapeutic and which are considered nontherapeutic? The ways in which patients are affected by these staff attitudes are delineated.

4. Which aspects of the hospital social structure are thought to be related to patient improvement? The following areas of hospital structure are examined: the degree of democratization of the structure, the channels of communication, the definition of the functions of hospital personnel, and the atmosphere of the ward. In addition, the effect of the hospital physical plant on patients is indicated.

5. What ways are used to bridge the gap between the protected environment of the hospital and the more unprotected existence of community living? The approaches which can be instituted while the patient is in the hospital and those which might be instituted after the patient returns to the community are suggested.

Throughout the monograph, attention is focused on core problems faced by rehabilitation workers and, on the basis of activities thus far conducted, suggestions for further research are advanced.

From THE CHILD

Of Public Health Interest

In the November 1953 issue, Margery D. McMullin, executive director of the Handicapped Children's Home Service in New York City describes how "To Keep Up Home-Bound Children's Morale" by recreational activities which are stimulated by "volunteer" visitors to the homes.

And John G. Hill, research director of the Health and Welfare Council, Philadelphia, considers the question, "Can Cost Accounting Help Social Agencies?" He describes the experience of the Family Service of Philadelphia in analyzing its unit costs of service and mentions that the family agency, one of the 10 largest in the United States, is publishing a cost study manual. (Copies may be purchased upon publication by addressing the agency at 311 South Juniper Street, Philadelphia 7.)

Also in the same issue, the efforts of a local committee in bringing community health and education services to the families of mi-

gratory agricultural laborers in Fresno County, Calif., are described by the committee's vice chairman, Mrs. I. H. Teilmann.

In the October 1953 issue, Dr. Anna L. Philbrook, director of the New Hampshire State Child Guidance Clinics for the past 10 years, discusses emotional problems of the crippled child, in an article based on her report at the 18th New England Health Institute. She writes, "We should not let the crippled child depend on us too much, but rather we should show him that we are aware of the force of health that is in him. Let us give that force a chance to strengthen itself . . ."

The Child will be changed in name to *Children* and issued bimonthly beginning with the January-February 1954 issue. The subscription rate is \$1.25 a year (\$1.75 for foreign mailing). Single copies are 25 cents each. The publication is issued by the Children's Bureau, U. S. Department of Health, Education, and Welfare.

An Analysis of Ratbites In Baltimore, 1948-52

By WILLIAM SALLOW

THE PROBLEM of persons being bitten by rats is often superseded by the more pressing problems associated with rodent control. If the situation were merely mechanical, the treatment of a laceration or wound, while important, would not be too significant. However, when the rat is so closely associated with man that it can bite him, the possibility of disease transmission exists from the vectors present or from such pathologies as leptospirosis, salmonellosis, or ratbite fever.

The establishment in May 1947 of a separate division of rodent control in the Baltimore City Health Department resulted in focusing attention on the incidence of ratbites as an important phase of a control program.

The data presented in this report was accumulated by the division of rodent control on a citywide basis. Hospital records were checked wherever possible, and each victim or his family was interviewed. A previous study by Richter in 1945 (1) was based on data from a limited area of approximately 2 square miles, known in Baltimore as the Eastern Health District. The differences between the data of the two reports can be attributed to the greater scope of the present report.

Ratbite Case Reporting

In Baltimore, a city of more than 900,000 persons which at one time had a rat population thought to equal the human population, there is no provision for the compulsory reporting of ratbites. No cases of ratbite were reported prior to January 1948, but in that year a total of 14 ratbites from 14 separate locations was reported to the division of rodent control. Of this total, 36 percent of the ratbites were re-

ported by the police, 50 percent by relatives or friends, 7 percent by the admitting hospital, and 7 percent by miscellaneous sources. On the other hand, 42 percent of the cases were treated at a hospital.

Of 322 ratbites tabulated between January 1, 1948, and December 31, 1952, hospitals reported 31.7 percent of the cases to the health department, thus leading in the reporting as would be expected, since 231 or 71.7 percent of all the persons bitten were treated in hospitals. Parents and relatives reported 21.7 percent of the cases. Private physicians treated 8.4 percent of the bites but reported less than 1 percent of the total (table 1).

These statistics, however, do not reveal the true picture of the great improvement that has been accomplished in reporting. In 1948 hospitals reported 7 percent of the ratbites, and in 1951 more than 54 percent of the reports came from this source. The figures for 1952 again show more than 50 percent of the ratbites were reported by hospitals. The reporting by physicians, while not as spectacular in improvement, continues to show an increase. Approximately 15 percent of the reports were from within the health department, the cases having been discovered by sanitarians or public health nurses. The police have been invaluable in their assistance by reporting over 13 percent of the bites.

All such information is secured without benefit of a definite requirement for reporting and can probably be attributed to the educational activities of the health department as well as the excellent cooperation of the hospitals and the others involved.

Ages of Victims

Children 6 years of age or less are the predominant victims of ratbites. Approximately 60.5 percent (195) of all victims were in this age group, and 24.8 percent (80) were infants less than 1 year old. An additional 11.2 percent (36) occurred in children from 7 through 12 years of age; 6.2 percent (20) occurred through the age of 21, while 16.1 percent of the total were reported for persons over 21. In approximately 6 percent of the cases no age was reported (table 2).

Mr. Sallow is chief of the division of rodent control, sanitary section, Baltimore City Health Department.

Table 1. Agencies reporting annual totals of ratbites

Reporter	Total		1952		1951		1950		1949		1948	
	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent	Num- ber	Per- cent
Hospital.....	102	31.7	52	52.0	32	54.2	12	15.0	5	7.2	1	7.0
Parent or relative.....	70	21.7	14	14.0	8	13.5	24	30.0	24	34.8	-----	-----
Police.....	45	13.9	18	18.0	6	10.2	12	15.0	4	5.8	5	36.0
Occupant, friend or neighbor.....	20	6.2	3	3.0	-----	-----	6	7.5	4	5.8	7	50.0
Health department san- itarian.....	18	5.6	4	4.0	1	1.7	4	5.0	9	13.0	-----	-----
Health department nurse.....	19	5.9	4	4.0	2	3.4	6	7.5	7	10.2	-----	-----
Visiting nurse.....	11	3.4	0	0	3	5.1	6	7.5	2	2.9	-----	-----
Physician.....	3	.9	1	1.0	1	1.7	1	1.3	-----	-----	-----	-----
Miscellaneous.....	34	10.6	4	4.0	6	10.2	9	11.2	14	20.3	1	7.0
Total.....	322	99.9	100	100	59	100	80	100	69	100	14	100

In approximately 80 percent of the cases, the victim was bitten while asleep, generally in the very early morning. Of course, incidental bites have occurred through inadvertence, as for example, a policeman who was bitten on the ankle while interrogating a householder, or the young school boy who chased a rat and caught it.

Thus it can be assumed that the next Baltimorean to be bitten by a rat will probably be 6 years of age or under, possibly an infant of less than 1 year. He will be treated at a hospital, which will then report the case to the division of rodent control. Chances are the victim will be bitten on the finger or hand, for 161 of the bites covering the 5-year span of this report were on hands, fingers, or arms; 68 were on legs or lower extremities, and 70 on the head or about the face.

More than the average number of ratbites occurred from June through November with a peak during July and August. February has been the month of least activity, closely followed by January and December. In 1951, however, bites in January and February were higher than the monthly average for that year, and no bites were reported in June. Thus, experience to date has indicated that ratbite occurrences are not predictable on a seasonal basis.

Geographically, 90 percent of the ratbites reported have occurred within 2 miles of the center of Baltimore. There is a well-defined area of occurrence west and northwest of the business district, another slightly smaller area east and

still a smaller clump south of this district. The business district, on the other hand, remains relatively free with but 1 or 2 reported cases in the 5-year period. These areas in which ratbites occur are in general "the blighted areas" of the city.

In an attempt to draw an analogy between ratbite occurrences and complaints by the public concerning rat infestation an apparent ambiguity is presented. More persons complain about rats from outside the ratbite area than from within it. Therefore, the assumption may be drawn that in these bad areas, the inhabitants are either complacent about the rat problem or unaware of the assistance afforded by the municipality. Relying on experience, the inclination is toward the former assumption—these people apparently are not too concerned about rats as an immediate problem of daily existence.

Rodent Control Operations

As the cases of ratbite are brought to the attention of the division of rodent control, a sanitarian is assigned to investigate each case. A complete inspection of the property involved is made and a survey of adjoining properties and the exterior of the entire block is completed. As a general rule, the premises on which ratbites occurred were found to be moderately to heavily rat infested.

A random selection of cases indicates rats usually entered cellars or basements through

defective or rotted doors or window sills and open unscreened basement windows. The heaviest rat infestations were found under wooden floors constructed over dirt surfaces in basements. Crawl spaces, varying from 6 inches to 3 feet deep, under a portion of the ground floor where basements were not fully excavated were also heavily infested.

Once the rat has gained entry and has established a harborage, its progress throughout the remainder of the premises is in direct proportion to the interest the occupants have in eliminating it and the abundance of food that is available. The rat migrates to the kitchen for obvious reasons and as it builds up a family, it occupies more of the house than man. The rat uses available areas such as spaces behind walls and between floors. In addition to structural harborage, it can be assured of such incidental homes as those provided in trash and debris and "saved" materials stored in basements, closets, and occasionally in an attic.

All necessary corrections to accomplish ratproofing, rat eradication, and improvement of sanitation are instituted under the guidance of the health department. On the infested premises in which ratbites occur, eradication measures must be undertaken immediately by "competent persons," and the division requires notification of the time and the manner of such procedures. Improvements in sanitation and ratproofing must be accomplished within a time limit prescribed by the notice. The notices may be pursuant to the general nuisance abatement ordinance or the provisions of the Ordinance on the Hygiene of Housing.

Dangers From Rats

Where rats become so intimately associated with man that they share the same abode and

leave their mark on the anatomy of man, disease implications are apparent. "Where the mean temperature is 45° or less, fleaborne diseases appear to be occasional, accidental, and self-limited" (2). Fortunately, Baltimore is well north of the average winter temperature zone of 45°. Nonetheless, in this city it is possible to import flea-infested rats which find harborage in warm basements.

It was just such an "accidental" situation which occurred in late 1946 and early 1947 when 7 cases of endemic typhus with 1 fatality occurred in a crowded row of houses not far from a local railroad line (3).

No evidence of plague in Baltimore could be found by complete search of city health department records. However, as recently as early 1951, a case of ratbite fever (*Spirillum minus*) was diagnosed in a local hospital, and in 1951 and 1952 the first 3 cases of Haverhill fever were recorded (4).

The presence of *Leptospira* in significant proportions in the rat population has been demonstrated in local studies (5) and confirmed by several cases of leptospirosis. Although typhus, plague, and leptospirosis are not transmitted by ratbites, it is well to consider the three diseases whenever rats live in close proximity to persons. The role of rats in ratbite fever, also known as Haverhill fever, has been defined by the authorities with the exception of the occurrence of sporadic cases of Haverhill fever without recorded reference to ratbites (6).

The high percentage of ratbites occurring in children 6 years of age and under gives some cause for reflection. Why the preponderance of victims in this age group? Is it possible that rats sense the defenselessness of the very young? Perhaps these occurrences can be at-

Table 2. Annual number of ratbites within age groups

Year	Under 1 year	1-6 years	7-12 years	13-21 years	Over 21 years	Age not determined	Total
1948.....	1	5	0	0	0	8	14
1949.....	20	26	7	6	3	7	69
1950.....	18	26	9	6	16	5	80
1951.....	16	19	8	6	10	0	59
1952.....	25	39	12	2	22	0	100
Total.....	80	115	36	20	51	20	322

tributed to some extent to carelessness or neglect by parents in failing to cleanse the child after feeding and before putting him to bed. Many persons have reflected on this problem without providing more than theoretical assumptions. Only through the continued and concerted efforts of the health department directed toward eliminating those environmental factors that favor rat propagation and rat life can we hope to reduce the occurrences of ratbites and the potential ratborne disease hazards.

Summary

Baltimore does not require reporting of ratbites. However, through education by health officials and the excellent cooperation of hospitals and other agencies, this information is now being obtained.

Children 6 years of age or less are the predominant victims of ratbites and the incident usually occurs in the early morning while the victim is asleep. Most often the victim is bitten on the arm or leg. Although not predictable on the basis of present limited data, the peak season for these occurrences appears to be during July and August, and a steady de-

cline is noted to a low in February. Ninety percent of the ratbite incidence takes place within 2 miles of the center of the city. All are investigated and corrections are required by the Baltimore City Health Department's division of rodent control.

The close association of rat to man, as demonstrated by many ratbites, causes reflection as to the potential of ratborne diseases.

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Municipal Sewage Treatment Plant Construction

Contracts for 204 projects to abate water pollution and conserve water resources, with a total expenditure of \$64.6 million, were awarded by municipalities during the second quarter of 1953.

Of the 204 projects, 118 are for new plants and 86 are for additions, enlargements, or replacements of existing facilities. Individual projects range in cost from over \$22 million for the city of Miami proper for a new plant to \$1,590 for improvement in San Francisco.



Programs and Problems in Professional Education And Inservice Training of Health Personnel

The evaluators find that the cooperative health programs of the Institute of Inter-American Affairs and the Latin American Republics have made no greater contribution toward the advancement of health and sanitation than through their training and education activities. To hundreds of individual Latin Americans, these activities have meant greater opportunity for the cultivation and exercise of their natural talents. To their countries, they have meant higher levels of technical competence and informed leadership for health and sanitation work.

TWO BROAD PRINCIPLES guided the evaluation of the training and education activities of the bilateral health programs:

1. Well-trained personnel are an indispensable part of the foundation upon which strong and effective organizations are built. Even with a good program, reasonably adequate

funds, and a satisfactory plant, the services provided will be no better than the competence of the operating personnel. The persons responsible for the establishment of the *Servicios* in Latin America were fully aware of this principle, and from the beginning training was accorded a high priority.

2. Training is part of the whole fabric of health services. Training of personnel and provision of facilities for its utilization are in reality a single problem, for if training is not to lose its primary purpose, which is to assure good services, personnel when trained must have a place for employment.

This review of training and education in Latin America is the ninth in a series of excerpts from the Public Health Service's report of its evaluation of the Institute of Inter-American Affairs bilateral health programs undertaken during the decade 1942-52. Information concerning the evaluation survey and the origin and structure of the bilateral health programs can be found in the September 1953 issue of Public Health Reports, beginning on page 829. Other excerpts from the report have appeared in the October and November 1953 issues.

Availability of Personnel

An examination of the personnel situation at the time of the survey revealed that, in general, trained personnel were inadequate in number to staff existing health facilities. This was most in evidence in the field of hospital nursing.

Many large hospitals were operating without a single graduate nurse, and many more had very few. In Chile, where nursing was more advanced than in many Latin American countries, a tuberculosis hospital with a bed capacity of 460 had 16 graduate nurses and 74 auxiliaries; the nursing staff of a 380-bed general hospital consisted of 15 graduate nurses and 300 auxiliaries. In Ecuador, where nursing as a profession is of very recent origin, one 950-bed hospital was employing 3 graduate nurses and 24 trained auxiliaries, most of the nursing service being given by untrained aides.

Sanitary engineers, sanitary inspectors, and even physicians were also clearly insufficient in number if entire populations were to benefit from health services. In many of the countries visited, however, little effort to provide health services outside the large urban centers was in evidence. According to the latest figures available at the time of the survey, the entire medical profession of Bolivia was serving only one-third of the population. In Brazil, 75 percent of the physicians of the country were serving the 24 percent of the population living in towns of more than 10,000; only 25 percent of the physicians were available to meet the needs of the remaining 76 percent of the population, essentially rural. A similar situation was found in Ecuador, where 50 percent of the physicians were serving the 15 percent of the population living in the cities of Quito and Guayaquil.

The reason for the concentration of the medical profession in cities was basically economic. Only in the large urban areas could a physician earn enough to justify the time and money required to become a physician, and only there were to be found the medical facilities, such as hospitals and laboratories, which would enable him to practice the type of medicine for which he had been trained.

Training Facilities Needed

With the great need for trained personnel in urban institutions, especially for nurses, nurse's aides, and hospital administrators, and an even greater need in the rural areas for physicians, the facilities for the preparation of all types of health workers are apparently extremely inadequate. Many of the institu-

tions claimed that there was not enough money available to permit the employment of a larger number of well-trained personnel and that the imbalance seen everywhere between the need for and the supply of well-prepared workers could not be corrected simply by establishing more educational institutions. Notwithstanding this reasoning, more facilities for training are indicated.

The basis for this judgment can be illustrated by the hospital situation. During the field survey, substantial evidence was found that the average hospital stay, and therefore the average cost per patient, could be substantially lowered by improvements in administrative, medical, nursing, and therapeutic techniques. Under good management provided by a well-trained hospital administrator, the patient stay at the university teaching hospital in Santiago, Chile, was lowered from 26 days in 1946 to 16 days in 1951. In a number of hospitals the average stay of patients with typhoid fever, typhus fever, and venereal diseases had been substantially reduced by the use of certain of the newer antibiotics.

The consequent reduction in costs in the instances cited may be said to bear a direct relationship to the quality of the personnel administering the health services. Savings brought about by improved quality of personnel would be available to increase the number of workers of all categories. The major question, therefore, may not be whether a hospital can afford well-qualified personnel, but whether it can afford to continue operations without such personnel.

Quantity vs. Quality

The problem of staffing a health institution, whether it be a hospital, health center, or other type of organization, involves quantitative as well as qualitative considerations. Again using the hospital for purposes of evaluation, though recognizing that the principles have broad applicability, it may be asserted that in no country will there ever be a sufficient number of professional nurses to perform all the traditional functions of nursing. Even in the United States, where trained nurses are far more numerous than in Latin America, this fact

is now recognized and generally accepted. It has become necessary to study and analyze nursing functions in order to decide which must be performed by the highly trained nurse and which may be safely performed by a person with less training.

The general concept today is that the nursing service of a hospital or a health program may be broken down into groups of functions. Each of these groups may be performed effectively by persons with widely different backgrounds and training. The quality of service will be improved when training is based on the requirements of the functions within each group and the groups are integrated to provide complete patient-centered care. The professionally trained nurses in such a system must be responsible for the training of personnel as well as the coordination and supervision of their work.

Considerable experimentation in the use of subprofessional personnel was being carried on in several countries of Latin America. In the Amazon Valley wide use was being made of auxiliary nurses in the hospitals and *visitadoras* in health centers. In Uruguay most of the public health nursing service of the health centers was being provided by specially trained *visitadoras* working under the supervision of graduate nurses. Many more examples might be cited, but none of them indicate that the quantitative aspects of the nursing problem have been adequately met. Furthermore, in many instances the quality of the subprofessionals' work has left much to be desired.

Further experimentation directed toward a solution of the quantitative as well as the qualitative aspects of personnel employment in Latin America is highly desirable. Nowhere is such experimentation more urgently needed, nor does it have a more favorable environment in which to thrive, than in Latin America.

Inservice Training for Professionals

Apprenticeship training was employed rather extensively in the early years of many of the *Servicios* and continues to be of considerable utility. For example, a United States sanitary engineer on the field party staff and a Latin American engineer untrained in sanitary engi-

neering may work together as a team, the former serving as the tutor and the latter as the apprentice. Over the years a rather large group of competent Latin American sanitary engineers has been created by this method of training. It has also been employed to train physicians and graduate nurses for public health work. Sometimes apprenticeship training was supplemented by academic training through the fellowship program of the Institute. Such training offers an excellent opportunity for identifying individuals who should receive specialized academic training.

Another type of inservice training provided in a few areas of Latin America was the planned conference. For example, the nurses on the staff of the Cerro Barón Health Center in Valparaíso, Chile, were required to attend a weekly conference at which each shared her experiences with the others in regard to special problems encountered and methods used for solving them, successful or not. The advantage of this type of inservice training is that the individual experience becomes the group experience and each person profits.

The planned conference may, of course, include more than one category of worker. All the health center personnel—physicians, dentists, engineers, nurses—may be assembled at regular intervals for the purpose of sharing experiences, analyzing problems, discussing possible solutions, and planning new undertakings. Such conferences tend to weld the group together so that it thinks of itself and conducts itself as a team. A sort of mass-action phenomenon results, producing an effect which is something more than the sum of the individual activities.

Inservice training of professionals should be a constant preoccupation of the administrators of every *Servicio* since it provides the means for continuous improvement in the quality of performance.

Specialized Academic Training

In the early period of *Servicio* operations, it was necessary to send nationals abroad for specialized training. To this end, a fellowship program was established by the Institute, and hundreds of physicians, engineers, and nurses



Top: The National Superior School of Nursing at Bogotá, Colombia, was built and equipped by the Servicio. Center: Student nurses receive instruction from a Servicio staff member in La Pas, Bolivia. Lower: As part of their inservice training linked with field service, the nurses meet with their supervisor to discuss plans.

were sent to the United States. Although this program eased the situation, it did not solve the problem in any country. No fellowship program could ever hope to meet the entire need for specialized personnel; each country must solve the problem in its own way.

At the time of the survey, a number of the Latin American countries had taken steps to provide academic training in various branches of public health. The Faculty of Hygiene and Public Health of the University of São Paulo in Brazil, the School of Public Health of the University of Chile, the School of Public Health and Hygiene of the Secretary of Public Health and Assistance in Mexico, and the School of Tropical Medicine of the University of Puerto Rico were offering courses in such subjects as public health nursing, hospital administration, maternal and infant hygiene, industrial hygiene, health education, sanitation, statistics, and public health laboratory techniques. The Graduate School of the Autonomous National University of Mexico was offering courses in sanitary engineering.

There are distinct advantages to training Latin Americans in their homeland instead of in the United States. It is less expensive since both travel expenses and the cost of living are less. The period of adjustment is shorter because of the language, social, and cultural similarity between the various countries. It is recommended that wider use be made of the Latin American institutions for fellowship training, reserving the United States institutions for special cases.

The men and women who have benefited or who will benefit as a result of specialized academic and inservice training are, for the most part, the product of the various national Latin American schools of medicine, dentistry, engineering, and nursing. Public health as well as medical services, therefore, is conditioned in a very real sense by the quality of medical, dental, engineering, and nursing education.

Logically, any effort to advance a broad health program—one that neglects neither preventive nor curative medicine and one that is concerned with environmental as well as personal health—must take into account all these educational institutions.

Schools of Nursing

Establishing schools of nursing or strengthening those already in existence received considerable attention during the decade under survey. Projects were sometimes undertaken as a joint effort of the *Servicios*, the Pan American Sanitary Bureau, and the Rockefeller Foundation, in collaboration with the appropriate national ministry.

In developing a school of nursing, several factors must be considered: recruitment of students, housing, classroom and teaching facilities, and financial support for the school. Perhaps most important is a faculty capable of planning programs which meet specific needs, developing curriculums for effective learning and practice areas for supervised experience in patient care, and reevaluating the programs to determine how well the objectives have been accomplished.

The National School of Nursing of the Central University of Quito in Ecuador is an example of a project which has shown excellent results in progressive national participation and which demonstrates the possibility of inter-agency cooperation.

Before 1942, there was a school of nursing at the Hospital Eugenio Espejo in Quito which conducted a 3-year course. The school was directed by a physician, and all instruction was given by physicians. The curriculum was limited, and there was no opportunity for supervised clinical experience. There were no residence quarters for the students.

In 1943, at the request of the Minister of Health, two nurses were assigned to Ecuador by the Pan American Sanitary Bureau to assist in reorganizing this school of nursing or if necessary to establish a new modern school of nursing. The decision was to establish a new one. The *Servicio* agreed to reconstruct and adapt a building provided by the Ecuadorian Government to house the new school. The Rockefeller Foundation furnished some of the equipment, assisted in the initial cost of operation, and provided consultation service.

From 1942 to 1949 one of the United States nurses assigned to Ecuador was director of the school of nursing. During 1947 and 1948, an Ecuadorian nurse, a graduate of the first

class, was sent to the United States for a year's graduate study. In 1949 she became assistant director of the school and in 1950 became the director. The Institute nurse continued to give consultation but gradually turned over more and more of the responsibility to the new director. By early 1952 the Government was completely supporting the school of nursing as a part of the university, and the *Servicio* was providing some scholarships to students. An advisory committee composed of representatives of the university and the Ministry of Health was working with the school faculty in setting up and maintaining standards. There has been a continuous attempt to keep the requirements for admission, the provisions for clinical experience, and the curriculum content in line with the needs of the country. At the end of 1951, 98 nurses had graduated from the school and 60 students were enrolled.

At the time of the survey the Institute was cooperating in the building programs of 8 schools of nursing: 1 each in Guatemala, El Salvador, Colombia, and Ecuador, and 4 in Brazil. Assistance was being given to the operation of 12 schools: 1 each in Colombia, Haiti, Ecuador, Uruguay, Paraguay, and Venezuela, and 6 in Brazil. Some technical consultation on nursing education has been provided in all countries, even when no nurse has been specifically assigned for that purpose.

It is doubtful whether the schools of nursing in Latin America should be patterned after those in the United States. Rather, it seems wise to prepare nurses especially (a) for work in those particular fields which constitute the major health problems in their countries and (b) for the training and supervision of auxiliary personnel in hospitals and health centers.

In view of the needs of the countries, it is strongly recommended that continued support be given to schools of nursing. This support may take the form of (a) construction of buildings to house schools and, when considered necessary, to provide housing for the students; (b) improvement of practice areas, which may include use of funds for reconstruction of buildings or purchase of equipment to provide basic essentials for patient care and assistance in improving the efficiency of operation of existing institutions; and (c) assistance, on a consulta-

tion basis, in the administration of the school, curriculum planning, and preparation of instructional personnel.

Medical Education

Analysis of medical education in Latin America was based upon what were regarded as certain essentials of a good school of medicine. Though far from complete, the following guides were found useful:

1. Limitation in the number of students, with appropriate methods for their selection. In most of the countries visited there was no limitation of matriculants. Chile, where the number was restricted to correspond with the teaching facilities, was an outstanding exception.

2. Selection of faculty members on the basis of teaching ability and scientific productiveness. They should enjoy reasonable security in respect to income and tenure. The faculty of the departments responsible for the basic sciences should be able to devote their attention exclusively to their departments without the need to seek additional employment. Relatively few of the schools of medicine observed in Latin America are so staffed.

3. Sufficient school-plant space in lecture rooms and especially in laboratories to accommodate the maximum number of students permitted to matriculate. The scientific equipment and supplies of laboratories should be adequate to permit good instruction in the basic subjects. Hospital wards of all types should be freely available for teaching clinical subjects. Workable relationships should be established with the local health services so that the social and preventive aspects of medicine may be taught. The hospital facilities for teaching clinical medicine were found to approximate adequacy more frequently than any of the other facilities.

4. A good library. Few of the schools observed were adequately equipped.

5. A budget large enough to sustain good operation and administration. Budgets of Latin American schools were reasonably adequate in only a few schools.

In a number of countries, it was apparent that much thought and effort were going into measures for the betterment of medical education. The country was rare in which no attention was being directed to the subject.

Service and Training

Schools of medicine everywhere have a crucial decision to make. Shall they devote their efforts to meeting the countries' needs quantitatively, or shall the quality of their product have priority?

As already mentioned, in many Latin American countries medical services are available to only a part of the population. For this reason there has developed a school of thought advocating the production of more and more physicians even at a sacrifice of quality and insisting that a poorly trained physician is better than no physician at all. This extreme position, as well as the opposite one, appears to be untenable if the best interests of the people are to be served. The solution of the problem in Latin America probably is to be found somewhere between these extremes.

The survey indicated that an important reason for the divergence of views respecting the aims of medical education stemmed from the fact that institutions responsible for education rarely were responsible for providing medical services for the people. A variety of agencies, official and voluntary, were operating in the hospitals, the health centers, and other institutions providing medical services. In most of Latin America, the ministry of health had the chief responsibility; yet, it was rare for this ministry to have more than a very minor voice in shaping policy regarding the number and quality of physicians to be trained to man those services. The ministry of health, the ministry of education, and the schools of medicine should study and plan jointly in order that the product of medical education may be prepared to carry on the type of services needed.

Servicio Responsibility

The fact that medical education has a direct relationship to medical care raises a question as to the *Servicio's* responsibility in this field. It is strongly felt that medical education should receive more attention by the *Servicios* than in the past. The fact that no sure course of action can be forecast should only add zest to the acceptance of an unusual challenge. Study of the many functions of physicians in public service, whether in hospitals, health centers, or

other public health activities, and classification of these functions into those which physicians alone can perform and those which might safely be assigned to other categories of personnel are steps that can and should be made in the near future.

In many areas a division of responsibility has already taken place. Immunization against smallpox and other diseases and the diagnosis and treatment of such diseases as malaria, hookworm disease, and yaws were being performed by nurses and sanitary inspectors. By such procedures it has been possible to bring to remote, rural populations the benefits of modern medicine and public health. It may well be that following painstaking study or job analysis of the physicians' work, organizations could be established, with appropriate safeguards, to extend services still further to such peoples. Success in such work, of course, depends in large measure upon the availability and the quality of supervision by physicians.

Training of Subprofessional Personnel

Training of subprofessional personnel may follow the same general plan as outlined for professional personnel—an apprenticeship type of inservice training and/or academic training. The need for both should be recognized, and both should be planned to assure competence on the part of each type of worker to perform effectively the tasks required. Ultimate responsibility for the training must rest with the professional personnel.

In a number of countries, there was found a body of experience in training subprofessional workers which would prove valuable in the event that the use of this type of worker should be extended. In Brazil, for example, a 6-month course for *visitadoras* was inaugurated at the Colatina Training Center. This course included demonstrations and supervised practice as well as carefully selected basic information. In Bolivia, where efforts to assist with the development of a professional school of nursing had not been successful, primary emphasis was shifted to on-the-job training of *visitadoras*. In Paraguay, *visitadoras* were being trained in an 18-month course sponsored by the *Servicio*-operated health centers.

The survey, however, uncovered a lack of permanent inservice training for subprofessional personnel. There appeared to have been relatively little attention to recruitment of persons for training as subprofessionals, nor was there evidence that the subject had been seriously studied in the health field generally.

There was observed a disposition to question the value of the subprofessionals on the ground that their educational backgrounds and understanding were such as to limit unduly their effectiveness as workers. It is suggested, however, that the ineffectiveness of subprofessional workers may result in no small part from the type of person that has been trained. Often the recruiting procedure has taken no account of the fact that certain types of jobs call for certain qualities. The subprofessional workers who are to be prepared to assist in handling the sick must have not only reasonably high intelligence and a degree of dexterity, but kindness, devotion, and a sense of responsibility. The sanitary inspector, who must work with people in advancing his program of environmental sanitation must be intelligent, persuasive, dexterous, inventive, and friendly.

The problem is how to identify in recruits these innate qualities. There are obvious difficulties to scientific recruitment, but this does not mean there are no advantages. The health administrator must look to the psychologist, the cultural anthropologist, and kindred professionals to furnish the techniques whereby the human qualities that are sought can be identified and possibly measured. Once a selection has been made among potential recruits, the process of training offers no inherent difficulty.

Fellowship Program

In addition to the training and education activities sponsored through the *Servicios*, the Institute of Inter-American Affairs directly finances and administers a fellowship program. From the initiation of the program in June 1943 through the end of 1951, 1,302 grantees had been sent to the United States for specialized training, including 753 doctors of medicine, 262 engineers, 120 nurses, 37 dentists, 15

health educators, 31 laboratory technicians, and 84 others, such as hospital administrators, veterinarians, architects, and chemists.

The significance of this program can be judged in part by the records of the recipients after their return to their own countries. Of 73 Chilean fellows, 69 (94 percent) were employed at the end of 1951 in positions for which they were trained or in similar ones; of 25 fellows in El Salvador, 20 (80 percent) were so employed; and of 28 fellows in Ecuador, 24 (85 percent) were in official positions. It was common to find that fellowship recipients had risen to positions of importance in their national health services and various ministries.

The fellowship program was well conceived and well administered, and it has resulted in strengthening the indigenous health organizations, as well as paving the way for the incorporation of certain *Servicio* projects into the permanent public health structure. The following suggestions, however, may deserve consideration:

1. In order to insure the greatest degree of success, it is essential that candidates be carefully selected as to ability to carry out a program at a foreign university; that there be, insofar as possible, a specific understanding regarding the position for which they are being prepared; that the course be carefully planned with the university so that the students have

an opportunity to take work which will meet their specific needs (whether it meets the requirements of the school for a degree or not); and that the instructional personnel in the host university be informed regarding the national needs for which the candidate is being prepared.

2. Training might prove to be of greater value if a plan were worked out whereby several trainees in the same academic field would be brought to the same school in the United States for study, and a North American specialist in that field, with some knowledge of Latin America, assigned to spend full time as adviser and tutor to the group. A variation of this approach might be to arrange for faculty members from schools in the United States to make visits to Latin America in order to gain better insight into the needs of the students.

3. Carefully planned and supervised experience might prove more valuable in some instances than organized academic courses.

4. It must be recognized that the success of any training program, particularly on an advanced level, is largely dependent upon the care with which plans are made for individual students. For best results in the fellowship program, there should be sufficient staff available at the Institute in Washington to develop plans for individual students, and to assist them with problems related to personal adjustments as well as those related to the training.

Public Health Reports Index for 1953

The index to *Public Health Reports* for 1953 (vol. 68) will be published as a separate and distributed to all subscribers early in 1954. In addition to author and subject entries for all material which appeared in the monthly issues for January–December 1953, the index will contain data for Public Health Monographs published during 1953.



Development of Environmental Health Programs

Recognizing that improvement in environmental conditions would aid materially in solving some of the major health problems of Latin America, the *Servicios* devoted considerable effort to the development of sanitation and other environmental health programs. Their undertakings are evaluated in terms of technical competence, benefits derived, and the degree to which they have strengthened national health services.

ONE OF THE PRIMARY objectives of the bilateral health programs during World War II was to provide an environment in which workers in the Latin American Republics could produce desired strategic materials. The most important environmental health problems during that period were those of malaria and gastrointestinal disease control, and improvement in sanitation was recognized as a major factor in attacking these problems. The early sanitation programs were concerned primarily with construction of small water supply systems and sanitary privies, though in some countries rather large sewerage systems were constructed. At the time of the Public Health Service survey, early in 1952, most of the permanent works installed during the emergency period were being maintained by the Latin American governments.

This is the tenth in a series of excerpts from the Public Health Service's evaluation of the bilateral health programs of the Institute of Inter-American Affairs undertaken during the decade 1942-52. For additional information, see page 1243 of this issue.

Following the war, emphasis was shifted gradually from meeting the needs dictated by war to providing technical assistance and financial support for continuous improvement of health. A safe water supply and adequate sewage disposal were recognized as basic essentials of a public health and sanitation program, and primary emphasis in sanitation was placed on these two factors.

Water Supply

The *Servicios* have built water supply systems in every country except Colombia. During the decade under survey, major efforts were directed toward the small cities and towns. Planning, designing, and construction were usually all done by the *Servicio*. Construction by private contractors was tried but generally found unsatisfactory because the contractors were not accustomed to doing such work and were not always available in the isolated locations where much of the work was done. Force accounts methods usually proved to be cheaper than contracting. However, in Mexico all work was being done by contract, and Brazil was gradually developing contractors competent to do the work.

Three advantages especially were apparent in the *Servicio* method of operation in building water supply systems. It provided opportunity for the development of experts who could devote full time to this activity, made possible a minimum of redtape in financing projects, and resulted in a minimum of friction among planners, designers, and builders. Low construction costs, by United States standards, were made possible by the use of low-cost labor and local materials whenever possible. Construction was generally done efficiently and well. For these reasons, the *Servicios* were generally stronger and had a greater appeal for the limited national funds in the field of sanitation than the indigenous health services.

There were disadvantages, however, to this type of operation. It might tend to stifle local initiative in the technical and administrative fields, and there was a decided tendency to bypass existing local agencies that had some responsibility for the construction or operation of water supply systems. In one country, the division of sanitary engineering in the national health service was abolished and its activities turned over to the *Servicio*. In another, responsibility for building public water systems was transferred from the national agency to the *Servicio*. Exceptions to this tendency were found, however, notably in Chile and Costa Rica. In Chile, the *Servicio* was assisting the national health service in the technical and financial phases of its sanitation program instead of developing competing programs.

The value of national organizations doing things for themselves is basic. In the long run, the development of administrative and operational units is as important as the development of technical competence or the fulfillment of the immediate desires of a community. *Servicios* might well direct their efforts toward the establishment of divisions of sanitation in the Latin American countries where they do not exist, and in all countries they should carry on the majority of their activities in the sanitation and engineering fields through such divisions. Working through indigenous health agencies will facilitate the conversion from bilateral to unilateral programs.

Water supply systems were generally very simple constructions. Ground water was usually the source of supply, and the supply was usually brought to the place of use by gravity. Gravity-pressured ground water systems are advantageous because they are relatively inexpensive to operate and simple to maintain. Distribution systems were generally modest compared with those in the United States. Since there is not the need for fire protection that there is in the United States and since most systems are unmetered, small-capacity distribution systems are favored because they reduce water wastage occasioned by faucets being left open.

Considerable credit is due the *Servicios* for their efficiency in constructing water supply systems. Much improvisation was observed, which went far in overcoming the handicaps of undertaking major construction in remote areas which were not served by ground transportation and where few, if any, skilled artisans were to be found. Many projects were built with a minimum of construction equipment. In one Honduras town, where all materials had to be moved by air, the only equipment provided was hand tools.

Construction costs averaged about \$16 per capita, with a range of from \$5 to \$43. These costs, though not exceedingly high, represented a considerable investment for Latin American countries, whose per capita annual income, based on United Nations estimates, was about \$155 in 1949.

Shortcomings of water supply construction programs could generally be attributed to insufficient consideration of the economic status and cultural background of the community to be served. Some examples were observed of expensive, ornate architectural treatment of buildings and the incorporation into projects of unnecessary gadgets, such as totalizing meters and various gauges.

In an effort to provide the utmost safeguards to the public health, chlorinators were placed on a great number of ground water supply systems, despite the fact that the quality of the water was generally satisfactory. This precaution was apparently not fully appreciated by

the recipient people, and perhaps half of the chlorinators were not in operation at the time of the evaluation survey. The lack of operating funds and the complexity of the chlorination devices, coupled with the fatalistic attitude of many of the people concerning disease, were identified as factors influencing the removal, the destruction, or the nonuse of chlorinating equipment.

Third-Party Contributions

Contributions by the people directly benefited by water systems are considered essential to their full appreciation of, and responsibility for, a community water system. The *Servicios* recognized this principle and in recent years nearly all systems built by them received local, or third-party, contributions. In the 177 completed projects, third-party contributions amounted to 38 percent of total costs. The amounts varied from small individual contributions of labor to contributions covering the total cost of the system.

Frequently, however, contributions promised by third parties did not materialize, and the *Servicio* was forced to use more funds than was originally allotted to complete a project. In one country failure of third-party contributions has been reduced by the requirement that such contributions be in the hands of the *Servicio* before any construction begins.

In a few instances, contributions of labor were successful, but the organizational problem of using gratuitous labor generally precluded its effective employment. Satisfactory use of gratuitous labor appeared to be limited to towns of not over 3,000 population where there was a strong local leader who could command support of the people and supply initiative. There also must be a well-recognized and pressing need for the water supply and no other way to obtain it.

Public Attitudes

Water supply projects were received enthusiastically by the people of the communities. However, it appeared that usually reception was based on the desire for water rather than upon the public health significance of a safe water supply. In one community local inhabitants felt that pure water was good for the

children but was unnecessary for the older people because they had developed an immunity to waterborne diseases. In another community the local druggist reported that the installation of a safe water supply had materially reduced the incidence of gastrointestinal diseases. His report was based on a reduction in sales of medicines widely used to control these diseases.

To really appreciate the effect of the installation of a water supply system on the citizens of a community, one should witness the inauguration celebration held at the completion of a project. It is a holiday, a festival that may last for as long as 2 weeks. It is solemn, with its religious dedication, and stirring, with its speeches by political and civic leaders. It is spectacular, with its parade and marching bands, its sports events, its bullfights, and its dances. For the time at least the people feel that the project is the most important thing in their lives.

Operation and Maintenance

Unlike some projects undertaken by the *Servicio*, the water supply projects were generally turned over immediately by the national government to the municipality for operation. In general, the operation and maintenance of *Servicio*-built water systems was inadequate because of the lack of competent operators and sufficient funds. A definite trend within the *Servicio* toward the training of water supply operators was noted, however.

In some countries, the *Servicios* were establishing local boards to act as policy-making and administrative groups and to be responsible for collecting the necessary funds for maintenance and operation. This procedure has worked well in Mexico, where all water users pay for water service. In Honduras, the *Servicio* not only set up the administrative board but trained the persons who would become the operators when the project should be turned over to the local authorities.

There is much to be done in securing better operation and maintenance of many of the *Servicio* projects. Unless maintenance is improved, the capital investment in some will ultimately be lost. In a number of instances, the systems which the *Servicio* built replaced systems which had been put into operation 30 to

50 years previously and had been allowed to deteriorate until there was very little left. It is apparent that responsibility for operation and maintenance cannot be left solely to local interests and that some national government agency (preferably a division of sanitary engineering) should assist the local people. The national agency could not only check on the safety of the supply, but also assist the local boards, administrators, and operators in all phases of operation, including financing and business administration.

Surveys

In Panama, where the *Servicio* program was being reinstated in 1951, a sanitary survey of all communities was being made as a logical primary step in undertaking a water supply program. Such information was not available in most Latin American countries, and water supply systems were being built with little regard for the priority of need between the various cities and without too much concern about the demonstration value of any particular project. The availability of third-party contributions was regarded as perhaps the greatest determining factor in deciding where supplies would be developed. Inasmuch as the *Servicios* cannot build all the systems desired, it would seem better to concentrate efforts on good demonstration projects and in areas where the health problems are most pressing.

Individual Supply Units

A relatively small amount of work has been done in the development of individual water supply units. This phase of sanitation has not received the emphasis it deserves. Individual units are inexpensive and can be built by subprofessional personnel. It seems advisable to have at least one demonstration project of this type in each country.

Sewage Disposal

The latest figures available at the time of the survey showed that a total of 101 community sewage projects had been undertaken at a cost of \$5,885,797. Third-party contributions amounted to 6 percent of the total cost. Only a few of these projects included sewage treatment.

The general impression gained during the survey was that communities wanted sewerage systems primarily because some neighboring community or the capital city had them. However, most Latin American communities were greatly in need of improved and expanded excreta disposal systems, and the cost of sewers was quite modest. The few figures available showed that construction costs amounted to about \$5 per capita.

It was a universal practice to use concrete sewer tile manufactured at the project site. No evidence of failure of these concrete pipes was found, even though they are subject to rapid deterioration if septic sewage is handled. The success in using these materials was attributed to skillful designing by the *Servicio* engineers.

Sanitary Privies

The construction of sanitary privies has been an important sanitation project of the bilateral health programs since their inception. This activity was carried on in every country. Fifty-seven projects costing \$415,000 have been undertaken, 15 percent of the funds supplied by third parties. In Brazil, about 20,000 privies were built; in Chile and Colombia, 3,000 each; in Venezuela, 9,000; and in Nicaragua, 2,500.

Construction of sanitary privies is fundamental to a sanitation program and ties in closely with the building of individual safe water supply units. It is a program which can be carried on by subprofessional workers, and it is effective in controlling intestinal parasites.

Privy building costs were found to be relatively high. The cost of a concrete slab and riser was about \$6, and that of a completed privy from \$11 to \$16, an excessive amount in some regions. In many small villages the cost of a privy would be close to 50 percent of the value of the home it services. Efforts to reduce costs by mass production and the development of new materials, such as precast, wood-reinforced concrete superstructures, were observed in Chile.

Stream Pollution Control

The disposal of community sewage into the nearest water course creates new health hazards for downstream water users. The danger of

this practice, which was found common to most *Servicio* sewerage projects, was quite evident because of the widespread use of the streams for bathing, laundry, and drinking purposes.

The economic condition in most of the countries, however, would seem to preclude the early installation of sewage-treatment plants. There are several possible solutions to the problem:

1. Instead of sewerage systems, individual septic tanks could be built which would discharge into the ground. They could be financed by the persons needing them. The rest of the community could be supplied with pit privies. This solution would be satisfactory in small- and medium-sized communities, as well as in suburban areas around the larger cities.

2. The lagooning of sewage for a 30-day period before discharging it to streams would be inexpensive and, where the lagoons are properly designed has been found to be successful, as in the western part of the United States.

3. The use of streams for other purposes than waste disposal could be prohibited, and public laundries, bathhouses, and water supply systems constructed so that the people would not have to use streams for these purposes.

Little evidence was found that industrial wastes were a problem of major significance. Generally, industrial wastes are discharged through separate outlets, with the dilution water available usually caring for these wastes satisfactorily. In El Salvador the industrial-waste problem connected with the coffee industry was investigated by United States engineers. However, no definite conclusions were reached or remedial measures taken. In Chile the *Servicio* has built three modern sewage-treatment plants and has joined with the Ministry of Public Works in supervising the operation of these and other plants which are the responsibility of the Ministry. These plants are well operated, and the personnel assigned to the operation project have been quite successful in obtaining additional sewer connections to the system.

In contrast to this situation, a sewage-disposal plant built by the *Servicio* at Santa Tecla, El Salvador, was being allowed to function improperly and to deteriorate to a point where it needed replacement. The condition of the plant clearly indicates that a followup must be

made by some competent person from a responsible agency after the construction of a sewage-treatment plant.

Vector Control

Malaria has long been a leading cause of death and economic loss in many parts of Latin America and has received a great deal of attention by indigenous health services. It was natural, therefore, that the *Servicio* should join the countries in their antimalaria campaigns in order to carry out more widespread and intensive programs. In the beginning, antimalarial measures were of the so-called permanent type, such as ditching, draining, filling, diking, and larvaciding with oil and toxic agents.

Vector control was greatly benefited by the development of new insecticides that have a residual killing power. The use of these insecticides has in many instances reduced the need for permanent control projects and permits carrying out antimalaria programs with less highly skilled technicians. Spraying, however, should not replace other means of control.

In Mexico, the *Servicio* was providing spray equipment free and furnishing DDT at cost. In Colombia, the *Servicio's* spraying program had stimulated the establishment of several commercial spraying firms that were providing services on contract. The *Servicio* was aiding such communities by checking the toxicity and coverage of sprays used by independent contractors. In El Salvador, Brazil, and Venezuela, vector control activities begun by the *Servicio* had been turned over to the national health services and were being successfully carried on by them.

Vector control by the *Servicio* in Ecuador was found to have been eminently successful. In the highlands near Quito, anopheles mosquitoes had migrated up the deep narrow valleys from the sea, bringing malaria with them. In the affected communities, the enlarged spleen rate in children ran as high as 80 percent. Populations were dwindling and some of the country's most valuable agricultural land was not being used. By drainage and other antilarval measures, mosquito-breeding areas in the highland communities were destroyed; 1,400 square kilometers of land were freed from anopheles

mosquitoes. Malaria disappeared and land values soared as agriculture was again extensively pursued. An incidental byproduct of the drainage work done for mosquito control was the improvement of the land for agriculture. The drainage made irrigation possible.

Industrial Hygiene

A division of industrial hygiene in the national government may be found in all of the Latin American countries which are partially industrialized. They have functioned primarily, however, in the field of labor-law enforcement and have not developed technical, fact-finding services with which to aid industry in the study of its health problems. There has been a conspicuous absence of preventive programs, and trained industrial hygiene personnel are lacking.

Agricultural workers, the largest group of workers in Latin America, should not be excluded from industrial hygiene programs. It is now realized that serious problems occur with the use of large quantities of insecticides toxic to human beings, the properties of which are little known. Much of the agriculture in Latin America may be considered "industry-in-the-field," since sugar, cotton, and coffee plantations employ thousands of workers under single management, making it possible to attack health problems of the workers effectively.

Efforts to develop modern industrial hygiene programs have been successful in Bolivia, Brazil, Chile, Colombia, and Peru. In Peru and Bolivia, laboratories and libraries have been established, personnel trained at home and abroad, and surveys made to define the problems. Corrections of many health hazards have already been made.

In Peru, the Department of Industrial Hygiene had a staff of nearly 50 workers, of whom more than 20 were professionals. During the 21½ years just preceding the evaluation survey, approximately 70 industries were studied and 7,200 physical examinations made. The medical examinations were being analyzed by machine methods. These analyses were to establish the incidence of silicosis and other occupational diseases as the basis for steps in their control.

The establishment of industrial hygiene programs has been accomplished with the concurrence of the appropriate ministries. The program was usually headed by a North American engineer who had had broad experience in the field. Sometimes he acted as a consultant to a national chief of industrial hygiene activities. National physicians, engineers, chemists, and other technicians were employed, the ratio of national professional staff to the United States professionals being about 14 to 1.

Although it has been found preferable to place the industrial hygiene program organizationally so that its activities may be closely coordinated with other phases of environmental health, only in Chile was the program placed in the Ministry of Health. In Peru and Colombia, however, the programs were placed under the administrative jurisdiction of the *Servicio*. In Peru, Brazil, and Bolivia, they were in the Ministry of Labor.

Miscellaneous Projects

A number of other projects for the improvement of environmental conditions were undertaken in several countries. Public laundries and public bathhouses were built rather frequently by the *Servicios*. These facilities were enthusiastically accepted. The people could easily comprehend their value, not so much from the public health standpoint, but as a convenience and a way to better living.

In El Salvador, the *Servicio* was engaged in a rather extensive slaughterhouse-building program. In the capital city, this project was fairly successful, but in the small towns, maintenance and sanitation of the abattoirs left much to be desired.

In a few instances, *Servicios* have assisted communities with their garbage disposal problems. Costa Rica was studying the possibility of composting garbage, and the *Servicio* in Brazil was preparing standard plans for small incinerators.

In some instances, the *Servicio* has been instrumental in training subprofessional public health workers in the field of sanitation. It was explained that more of this work would be done were there a demand for it, but it was considered unlikely that the demand would

develop until the realization of what this type of worker has to offer to health programs should become more widespread.

Summary and Conclusions

The need for environmental health programs, particularly sanitation programs, in Latin America is great and widespread. Improved environmental conditions will help lower the high infant mortality rate, make labor more productive, and prevent the enormous economic loss due to illness.

In general, the environmental health projects have been successful and have been accepted with enthusiasm by the recipient peoples. From an administrative, technical, and financial standpoint, the work of the *Servicios* compares favorably with that of the indigenous agencies.

Generally, however, *Servicio* sanitation programs have not strengthened existing health agencies. The use of *Servicio* personnel as consultants and the development of projects on a demonstration basis have not been widely practiced. Notable exceptions were found in Chile and Costa Rica, and the programs in these countries appear to be eminently successful.

In view of the different cultural, political, and economic patterns of Latin American countries, the importance of timing, and the varying objectives of the programs, it is impossible to establish definite criteria for evaluating the existing programs or to make detailed recommendations for their improvement. The following, however, may serve as guiding principles:

1. The *Servicio* should encourage the development of environmental health activities on as broad a base as possible, within the framework of the indigenous health services.

2. It should give major emphasis to planning, advisory, and directional services and devote less effort to detailed design, construction, and operational services.

3. It should make greater use of its prestige, influence, and knowledge to bring harmony between the various national agencies having an interest in environmental health problems.

4. Recognizing that American public health practices cannot be transposed without modification, the *Servicio* should encourage research in the methods and standards that will best fit Latin American cultural and economic patterns.

Public Health Developments in Liberia

This excerpt is from an address by Nelson A. Rockefeller, Undersecretary of Health, Education, and Welfare, before the biennial convention of the National Council of Negro Women in Washington, November 12, 1953:

"The first bilateral international health program in which the United States participated outside our own Hemisphere was in Liberia. Although Liberia has had close ties with the United States, it has not kept pace with the development of our own country. In 1944, however, the Public Health Service dispatched a mission to Liberia—at the request of President Tubman of Liberia—to help the Liberian government work toward a solution of its major health problems.

"Here was the situation that confronted the Public Health Service mission to Liberia in 1944: Preventable diseases were seriously hampering the economic and social growth of the country. There were only 6 physicians, 2 dentists, and 4 graduate nurses to serve a population of 1.5 million. There were only 230 hospital beds in the entire country, and no pharmacists or drug stores.

"The major accomplishment of the U. S. Public Health Service Mission has been the assist-

ance given the Liberian Government in developing the Liberian Public Health Service. In 1946, the Liberian Government's appropriation for public health activities was \$82,630. In 1953, the total expenditures of the Liberian Public Health Service exceeded one million dollars.

"With our help, Liberia has controlled malaria around the capital, Monrovia. A nursing school has been established. Smallpox is no longer a public health problem in Liberia. For the first time in the history of Liberia, a Liberian physician heads its own Public Health Service.

"He is Dr. Joseph Togba, born of tribal parents and educated at the Meharry Medical School. The U. S. Public Health Service brought Dr. Togba back to the United States to study at Harvard and Columbia Universities, in order to prepare him for his present post. He has succeeded magnificently. In 1953, he was one of three candidates for the Presidency of the World Health Organization of the United Nations.

"The international health and education programs of our Government now circle the globe. They have all been built on the lessons learned first in Latin America and the experience gained in Liberia."



Health Education in Principle and Practice

To work with—not to do things merely to and for people—became an accepted basic principle of the bilateral health programs in Latin America after the emergency period of World War II. This principle, the evaluators find, deserves much more emphasis in future, as well as current, programs, however, before the joint efforts of Latin and North American health workers can reach their maximum potential.

COMPREHENSIVE, effective health education programs embrace a wide variety of functions, all of which contribute to the overall goal of improved health practices. These functions may be grouped into the following broad categories:

- Planning the educational phases of programs designed to meet specific health problems of a community.

- Developing educational skills to carry out the program.

- Producing educational aids.

- Obtaining community participation in the solution of health problems.

- Stimulating and maintaining an active interest in the health problems of the community and in the action being taken for their solution.

This listing does not indicate the order in which activities should be undertaken, nor does it indicate priority of importance. At particular times or at specific stages of development,

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different functions will be given major emphasis. Neither is there implied any rigid standardization of action for all communities, for programs must be developed to meet the needs and interests of the people concerned. The list provides, however, a convenient classification with which to evaluate the scope of programs within any given area.

Planning the Educational Phase

Study of the development of the *Servicio* programs in the Latin American countries showed that in the beginning little consideration was given to the educational phases of the service or action programs. Emphasis was placed on immediate services, such as establishing a safe water supply, providing adequate sewage disposal, immunizing a population against diseases, and building and staffing preventive and curative medical clinics. These activities were planned with primary consideration for technical efficiency and effectiveness. The concepts of health, the attitudes, and the customary health practices of the people for whom these services were provided were given minor attention.

Later, as it became apparent that people must be willing to practice behaviors conducive to health if the full advantages of a health program are to be realized, the importance of systematic health education began to be stressed. In the planning that followed, emphasis was focused on direct educational programs which

were carried on in connection with specific service programs, though not always as part of them. For example, in Chile, the health education personnel of the *Servicio* assisted other staff members in deciding what knowledge and behavior were desirable. They then organized a program for teaching the information and behavior in terms of the educational levels of the individuals for whom it was designed and according to the number of contacts available to the professional personnel doing the work.

Gradually, in some of the programs, the fact that every health service has an educational influence on the recipient came to be recognized. For example, the way in which a physician examines a patient or performs an immunization, or a sanitarian inspects a restaurant, was recognized as contributing to the education of the people. The effect of the education might be good or bad, depending on the extent to which the recipient's needs were being satisfied.

However, oftentimes health activities were being carried on without regard to, or recognition of, the inherent educational opportunities. Many informational and motivational opportunities were being lost simply because the educational potential was not recognized and the activities not planned to result in a favorable learning experience. If the educational as well as therapeutic phases of clinic service, for example, had been a part of planning, even though an excessively heavy caseload was carried by many health personnel, the activities would have been more meaningful and might have resulted in a reduction of readmissions to the health center and probably would have avoided creation of some antagonisms.

For example, in one community half a dozen persons displayed health department prescriptions saying bitterly, "The paper cannot cure." The physician had prescribed medicines which cost far more than the people could pay. A little more attention to the behavioral aspect of the problem during the consultation would have suggested the need for an alternative method of treatment or for assistance in securing additional financial resources. Consideration of both the patients' needs and economic limitations would have developed more favorable attitudes toward the health center.

At the time of the survey, there still existed



Word-of-mouth is supplemented by demonstration and participation as a public health educator in Colombia works with a group of pregnant mothers on problems of diet.

among some of the health personnel the attitude that health education takes place only when teaching is done and that only the health educator should engage in health education. There was an obvious need for wider acceptance of principles such as these:

1. Health education is most effective when all health personnel, as well as other personnel engaged in educational effort, plan for the contribution each can make to meeting the health needs of a community.

2. Even though planning by one individual may appear to be logical and timesaving, such planning seldom results in concerted effort by all persons who have a part to play in carrying out the plan.

3. Emphasis in planning is best placed on the ways in which people learn and change their behaviors, rather than on the information professional people think should be given.

Development of Educational Skills

Possession of technical knowledge does not insure competence in stimulating learning among others. In addition, an understanding of the factors that influence changes in behavior and the development of skills in providing learning experiences for people are necessary. Certain of these factors and skills were identified as follows:

Understanding of the motivational forces for learning.

Ability to learn and respect the traditions,

social customs, and value systems of people, and ability to find ways in which education programs can fit into them.

Skill in stimulating a feeling of need when a problem is not recognized.

Competence in stimulating a desire to change.

Ability to find ways in which information can be made meaningful.

Skill in finding and developing channels of communication.

Ability to help people find solutions for their problems.

In the programs of a number of countries, the need to develop such skills has been recognized. Much of the emphasis, however, has been given to the training of teachers. Projects have included correspondence courses for rural elementary teachers in Bolivia, vacation courses in a number of countries, a textbook on health education for primary school teachers in Colombia, and a 5 months' course for normal school teachers in Brazil.

Top priority was being given to inservice training programs in Brazil. Recently, all key field personnel were brought together for a week of intensive orientation on supervision and teamwork in public health. Using a combination of the roundtable discussion and the workshop approach, and assisted by contributions from a cultural anthropologist, the group of physicians, engineers, and nurses developed a better understanding of how to work together more effectively in meeting the health needs of the community.

In both Chile and Brazil, health educators have worked with schools of public health toward the end of enriching the curriculum in health education. The need to develop practical field experiences in health education as an integral part of the preparation of public health workers is recognized as an urgent one.

Much still remains to be done in both pre-service and inservice training in developing an understanding of the learning process and the ways in which educational experiences can be made meaningful. One of the biggest challenges to the cooperative programs is to develop methods for applying the latest findings of the social sciences in practical education programs.

Production of Educational Aids

Most of the educational effort in a majority of the countries has been devoted to the production of materials, and the tendency has been to make other activities supplementary to this one. In the beginning, centralized production in Washington of educational materials for the use of all the countries was thought to be an economical and effective method for disseminating information. This practice was later abandoned because differences in the culture, customs, language, and problems of the people in the various countries made such production impracticable.

At the time of the survey, however, in many of the countries materials were still being developed at the national level with little regard to the needs of the several sections of the country in which they might be used, or the existing differences in culture, customs, literacy, or terminology.

Frequently, expensive materials were produced when perhaps less expensive ones would have served equally well as aids to learning. Most of the work apparently was focused on the production of mass media for informing the people, with little attention to the development of teaching aids.

There was practically no evidence of an evaluation of the materials developed in terms of what was learned from them. The measures of effort were usually the number of pamphlets distributed, the size of the audience for radio programs or movie showings, with no data on the number and kinds of people who had learned anything from the material to which they were exposed.

Educational materials should be considered as aids to a cooperative health education program and not as the program itself. More adequate planning of programs in terms of learning and more attention to training of personnel in educational procedures should result in the demand for, the production of, and effective use of, better educational materials.

Insofar as possible, all educational aids should be pretested through preliminary trial use with representatives of the group for which they are intended before they are finally produced and distributed. Much time and money may be saved through such pretesting.

Obtaining Community Participation

Opportunity to study the cooperative programs at firsthand gave emphasis to the principle that only with community participation can health programs be successful. These programs do not operate in a vacuum; rather, they are affected by innumerable forces arising from all aspects of community life.

There was considerable evidence of collaboration by various professional groups. For example, in one state in Brazil a committee composed of both health and education authorities was developing a plan for an overall school-community health program. Similar cooperative arrangements were found at the national level in several of the countries.

There was also some evidence that people in the community were working together to solve health problems. However, in some instances, the importance of the community effort had not yet been recognized by the professional health workers. Until health personnel understand the importance of having the people of the community work with them on health problems, maximum results will not be achieved from the programs developed.

With a view to their value in extending the limited community work observed in Latin America, the following suggestions, based upon experience and tested principles in furthering community participation, are offered:

1. A wide variety of social, psychological, educational, cultural, and related factors are to be considered in the planning and establishment of effective health services in any given local area. In a health education program, as in other health programs, functional knowledge of current attitudes, beliefs, customs, traditions, value systems, superstitions, and habits in relation to health and to everyday living is essential.

2. The expressed needs and interests of the people themselves are an important motivating influence for initiating individual, family, and community activities in solving health problems.

3. All communities, no matter how small, have an organizational structure on which to build. Potential avenues for reaching people



Health education artists of the Servicio Cooperativo Interamericano de Salud Pública in Colombia prepare education materials. Examples of their work appear on the walls.

exist and can be used for building community participation and cooperation.

4. There is no single pattern for solving community problems, since problem solving is essentially a creative process.

5. The creation of opportunities for people from all walks of life to become active partners in studying community health problems and in planning and carrying out health activities is an important component of health programs.

6. Problems and practices in health are bound together with many other aspects of daily living, for example, education, recreation, housing, social welfare, and earning a livelihood. Hence, health programs should be integrated with and related to problems, services, and resources concerned with the total well-being of the individual and the community.

7. The solution of health problems by a community provides an opportunity for fostering local, individual, and group initiative, pride, ownership, and responsibility. People are more likely to put into daily practice those learning experiences in which self-initiative and self-help are focal points in the education program.

8. A fundamental faith and belief in people's ability to contribute to the solution of their own problems is essential for effective and lasting health education.

Stimulating Interest

In some of the countries, public relations activities designed to stimulate and maintain ac-

tive interest in community health problems and programs were considered, along with the use of mass media, as the most important aspect of health education. In others, it was recognized that a good service program is the best approach to good public relations. The latter point of view is likely to result in the stronger and more permanent interest in and support of community health programs.

Role of Health Educators

During the early years of the bilateral health programs, health education consultants on the staff of the Institute of Inter-American Affairs visited most of the Latin American countries and concluded that the training of personnel in health education was one of the most outstanding needs. Consequently, in 1944, personnel were recruited, one from each of a number of countries, and given a year's training in health education in the United States. It was planned that these people would return to develop health education programs in their respective countries. Only a few of these individuals, however, were still working in health education at the time of the survey.

In recent years, health education consultants have been assigned to three countries. They have provided limited consultation to other countries. It appears that the countries served by full-time North American consultants have made the greatest progress in the development of comprehensive health education programs.

Many of the chiefs of field parties indicated a desire to strengthen the health education programs in their countries, but had not had full-time technical help to develop programs in terms of the specific needs of the country. There was a general feeling in many of the countries that a physician should be the director of the program. This attitude apparently sprang from considering health education only in terms of scientific content, with little regard for competence in educational methods and procedures.

Training Health Educators

In terms of long-range planning, the early selection and training of health educators for

service in Latin America is very important. If possible, health educators should be trained in Latin American institutions. This may well require strengthening of the health education programs in the existing public health faculties in Puerto Rico, Brazil, Chile, and Mexico. Assistance from the Institute of Inter-American Affairs in this work might include purchase of equipment and assignment of personnel to participate in curriculum planning, demonstration teaching, and supervision of field training.

The professional health educator should have a bachelor's degree, preferably with a major in education or social science. A postgraduate degree should be obtained from one of the public health faculties of Latin America. Following postgraduate training and at least 3 years of field experience, professional health educators might well be given a fellowship for training in the United States, where they may observe and participate in the health education programs in local or State health departments and supervision of field training.

At present, the number of persons qualified for postgraduate training in many of the countries is so limited that it seems necessary to accept for training individuals without degrees if current emergency personnel needs are to be met. Several methods of obtaining the essential people are under way. In Chile, the primary focus is on the preparation of health educators and teachers to work through the schools to the community. In Peru and Brazil, plans are being formulated to train health education auxiliaries who have had primary or secondary education and to assign them to local or district programs to provide educational service in the community.

Latin American countries are making tremendous efforts to raise the educational level of their people. As more and more people become better prepared educationally, these short-term training programs will need to be revised accordingly. Otherwise, health education in these countries will be disastrously restricted because personnel with limited preparation are not equipped to carry out the many complex functions of health education in an advanced society.

technical publications

CDC 1951-1952 Activities

Public Health Service Publication No. 302. 43 pages. Tables; charts; illustrations. Available on request to the Communicable Disease Center, Public Health Service, Atlanta, Ga.

This is a summary of major activities of the Communicable Disease Center during the fiscal year 1952. Abstracted from basic reports, the material presented here emphasizes composite end results and brings into common focus the varied activities of the several components of the center.

The report is divided into two general parts: General Activities, and Activities Directed Toward Specific Diseases or Problems. It is not a complete catalog of projects undertaken during the year, the intent being, rather, to indicate in general terms of scope, nature, and interrelationships of activities carried on in different areas of public health by the combined staff of the CDC.

A Comprehensive Program for Water Pollution Control for the Red River of the North Basin

Public Health Service Publication No. 293. 1953. 7 pages. Maps. Available on request to the water pollution control agencies of Minnesota, North Dakota, and South Dakota from the Basin Office, and from the Division of Water Pollution Control, Public Health Service, Washington 25, D. C.

The Red River of the North Basin, formed by the junction of the Ottertail and Bois de Sioux, forms the boundary between North Dakota and Minnesota as it flows northward. The basin contains 90 municipalities with sewer systems which serve a total population of 189,200. Industrial wastes contribute a population equivalent of 76,000 to mu-

nicipal sewer systems for a total untreated population equivalent of 265,200.

Despite the fact that 75 percent of the sewer municipalities and 65 percent of the industrial establishments provide treatment for their wastes, discharge of insufficiently treated wastes creates a health problem. Water quality for industrial uses, irrigation, and stock watering is also impaired.

This publication outlines a water pollution control program based upon the findings of a number of stream studies, surveys, and investigations undertaken by the health departments and water pollution control agencies of North Dakota, South Dakota, and Minnesota. Included are suggested improvements in treatment facilities for the towns in the area.

In conformance with the Water Pollution Control Act of 1948, the Public Health Service has adopted the comprehensive program developed by the States as meeting the requirements of the law.

The Dog in Medical Research

Public Health Service Publication No. 312. 1953. 19 pages. 20 cents.

In July 1949 a pamphlet was prepared by the surgery study section of the Division of Research Grants, National Institutes of Health, entitled "Care of the Dog used in Medical Research" (Supplement 211 to *Public Health Reports*). It included brief discussions on: animal research and medical progress; public relations; procurement; selection of dogs for specific purposes; care and handling; quarters; and feeding.

This publication is a revision of the earlier pamphlet and features a more comprehensive review of procurement problems and methods, as well as amplification of information on care and handling of the dog. It

was prepared particularly for the use of institutions and individuals receiving Public Health Service research grants, with the hope that the standards and recommendations would be used as a guide by all institutions using dogs for research.

The committee which prepared the revised addition consisted of Drs. Claude S. Beck, professor of cardiac surgery, Western Reserve University; W. T. S. Thorp, chief, section on comparative pathology, National Institutes of Health; and C. F. Schlotthauer, Mayo Foundation, Rochester, Minn.

Aortography by Percutaneous Catheterization of the Femoral Artery

Public Health Service Publication No. 283. 1953. 6 pages; illustrated. Available on request to the National Heart Institute, National Institutes of Health, Public Health Service, Bethesda 14, Md.

This publication, prepared for physicians, explains a method to improve the contrast study of the aorta. Percutaneous catheterization of the aorta via the femoral artery followed by X-ray examination makes possible the visualization of any portion of the aorta.

Materials and methods for use in abdominal and thoracic aortography are described. The advantages of the commonly used aortographic methods are compared, and a bibliography of percutaneous femoral artery aortography and of other methods is appended.

The Preschool Child Who Is Blind

Children's Bureau Folder No. 39. 1953. 23 pages. Illustrated. 10 cents.

The fourth in a series designed to help parents of a child with a handicapping condition, this booklet stresses the fact that the child who is born blind is more like a seeing child than different from him, and

technical publications

is of the same average ability. If the blind child gets the opportunity, he can learn to do almost everything that the child with sight can do.

The booklet tells how the parents of a blind child can help him develop skills and abilities and have the experiences of normal life. Attention is called to community facilities and agencies which can help parents.

A Comprehensive Program for Water Pollution Control for the Yakima River Basin

Public Health Service Publication No. 292. Water Pollution Series No. 51. 1953. 15 pages; tables; maps. Available from the Washington Pollution Control Commission, Olympia, Wash., and from the Division of Water Pollution Control, Public Health Service, Washington, D. C.

The Yakima River system drains an area of 6,000 square miles located on the eastern slope of the Cascade Mountain Range and lower plateau in central Washington, one of the oldest irrigated agricultural areas in the Pacific Northwest. The total combined wastes reaching the water courses from the 22 municipalities, institutions, and other population centers, and 33 industrial establishments have a population equivalent of 200,000.

During the summer of 1951, the Washington Pollution Control Commission conducted a water-quality survey in the Yakima River area. Their findings indicated that although substantial progress has been made in correcting conditions, the pollution problem is still causing serious damage and interfering with the valuable uses of the waters in the basin.

This publication discusses the water-use and water-quality objectives developed by the Washington Pollution Control Commission for the

basin. It also outlines the comprehensive program adopted to meet these objectives. Municipal requirements are given for various cities and industrial requirements for specified industries in the area. Appendixes include water quality objectives and minimum treatment requirements developed by the commission and minimum requirements for prevention of industrial waste pollution.

In conformance with the Water Pollution Control Act of 1948, the Surgeon General of the Public Health Service has adopted the Washington Pollution Control Commission's program as a comprehensive program meeting the requirements of the law.

The Virus and the Cell

Burnet, Sir F. Macfarlane, F. R. S. The R. E. Dyer Lecture 1952. Public Health Service Publication No. 328.

The second R. E. Dyer lecture at the National Institutes of Health, Public Health Service, was presented October 29, 1952, by Sir F. Macfarlane Burnet, director of the Walter and Eliza Hall Institute of Medical Research in Melbourne, Australia. This publication contains the text of Dr. Burnet's talk, as well as the introductory remarks of Dr. W. H. Sebrell, Jr., director of the National Institutes of Health and Dr. L. T. Coggeshall, dean, division of biological sciences, University of Chicago.

Dr. Burnet spoke on the interaction of influenza virus with the cell it parasitizes. He noted first that there is a basic similarity between the action of a bacterial virus on a coliform bacillus and the action of the influenza virus on the cells of the human respiratory tract or those of laboratory animals. The process of the interaction takes place in four steps: (1) Adsorption to the cell surface, at first reversible, then definitive; (2) entry of the virus into

the cell and its disappearance as an infective entity; (3) an eclipse phase toward the end of which manifestations of virus activity, hemagglutinin, and complement-fixing antigen appear a little before infective virus; and (4) the gradual accumulation of new virus and its progressive liberation into the fluid without, in this stage at least, any gross morphological damage to the cell.

Dr. Burnet discusses each of these phases in detail in light of the progress that has been made in the understanding of them. He gives particular emphasis to the genetic approach, saying "It is clear that the intracellular multiplication of viruses cannot be regarded as simply a matter of binary fission plus the occasional appearance of a mutant form. Multiplying genetic mechanisms can in some way interact to give recombination of qualities in some of the descendants."

In his conclusion Dr. Burnet points out two lines along which we may look for important advances in virus research: that of the genetic approach; and an attack on the nature of the soluble complement-fixing antigen. "If the idea is correct that the antigen is essentially a host cell component bearing a virus 'pattern,' we may have in our hands a clue to what most biologists would, I think, agree is the central problem of biological chemistry—the replication of organic pattern within the cell. If we can implant at will into the cell new patterns to which the cell will respond by the production of detectable replicas, we should possess a tool of great power."

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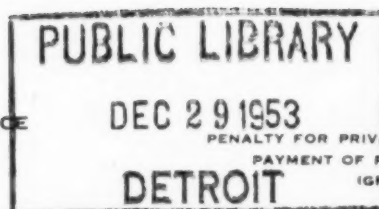
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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

THIS ISSUE of the Index to *Public Health Reports* is divided into two parts. Part 1 is the index to *Public Health Reports* and Public Health Monographs. Part 2 lists the monographs published concurrently with the various issues of *Public Health Reports*.

Titles of original articles are followed by the author's name in brackets. Example: Treatment of tuberculosis [Amberson]-----928.

The author entries appear in capital and small capital letters followed by the title. Example: AMBERSON, J. BURNS: Treatment of tuberculosis-----928.

A monograph entry in part 1 carries a "see" reference to part 2 and can be found by referring to the specified monograph number in that part.

A code is used to indicate the other entry categories. Summary articles of monographs are indicated by (MS) following the entry; original articles interpreting a monograph by (MI). Other classifications used in the index are: (B) for briefs; (CR) for conference reports; (E) for excerpts; (LN) for legal notes; and (SR) for short reports.

Titles of current departmental publications appear under the entry "Publications" and are not cross indexed. A compiled annual list of Public Health Service publications may be obtained from the Public Inquiries Branch.

A cumulative manuscript file of the 1952 and 1953 indexes is available for consultation.

Since the illustrative material on the inside of the front cover is a part of the contents, it is recommended that the front covers of each issue be included when binding the volume.

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- (E) Excerpt
- (LN) Legal note
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